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Path Analysis of The Effect of Social Interaction, Emotional Intelligence, and Learning Interest on Students' Mathematics Learning Achievement

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Abstrak

Kecerdasan emosional siswa dan interaksi sosial yang sangat rendah serta minat belajar siswa yang menurun pada kelas X merupakan permasalahan penting yang ditemukan pada SMA Negeri 2 Kefamenanu. Untuk itu peneliti ingin mengetahui seberapa besar pengaruh interaksi sosial terhadap prestasi belajar dengan atau tanpa variabel moderasi yaitu kecerdasan emosional dan minat belajar serta pengaruh antar variabel moderasi yang dipilih. Jenis penelitian ini merupakan penelitian kuantitatif dengan metode survey. Hasil penelitian kemudian dianalisis dengan statistik analisis jalur. Subjek dalam penelitian ini adalah siswa kelas X SMA Negeri 2 Kefamenanu. Jenis data yang digunakan dalam penelitian ini adalah data primer dan data sekunder. Hasil penelitian menunjukkan bahwa pengaruh paling besar adalah pengaruh secara langsung antara kecerdasan emosional terhadap prestasi belajar sebesar 62,41%. Selain itu terdapat pengaruh secara lansung antara interaksi sosial terhadap prestasi belajar sebesar 43,56%. Penelitian ini memberikan implikasi kepada pendidik untuk meningkatkan prestasi belajar siswa melalui interaksi sosial dan kecerdasan emosional. Hal ini juga memperlihatkan kebaruan hasil analisis bahwa kecerdasan emosional ternyata lebih berpengaruh terhadap prestasi siswa dibanding minat belajar.

Abstract

Students' emotional intelligence and very low social interaction, as well as students' declining interest in learning in class X, are important problems found at SMA Negeri 2 Kefamenanu. For this reason, the researcher wanted to find out how much influence social interaction had on learning achievement with or without moderation variables, namely emotional intelligence and learning interest, as well as the influence of the selected moderation variables. This type of research is a quantitative research with a survey method. The results of the study were then analyzed with path analysis statistics. The subjects in this study are students in class X of SMA Negeri 2 Kefamenanu. The types of data used in this study are primary data and secondary data. The results showed that the biggest influence was the direct influence of emotional intelligence on learning achievement at 62.41%. In addition, there was a direct influence of social interaction on learning achievement by 43.56%. This research provides implications for educators to improve student learning achievement through social interaction and emotional intelligence. This also shows the novelty of the results of the analysis, that emotional intelligence turns out to be more influential on student achievement than learning interest.

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Introduction

Education is a process designed in a structured way to create a learning environment and teaching methods carried out by educators and students interactively, so that students can optimize

their talents and abilities to face various problems in real life. The right of a student to obtain a proper education has been clearly stated in the 1945 Constitution Article 28C, Paragraph 1. However, the success or failure of the learning process is not only determined by the occurrence of the learning process. One of the important indicators of learning success is student learning outcomes. Learning outcomes can be interpreted as the level of success of students in learning subject matter at school, as expressed in the scores obtained from test results (Susanto, 2013). Learning outcomes are changes that occur in students, both cognitive, affective, and psychomotor aspects, as a result of student learning activities. Thus, it can be concluded that learning outcomes are changes in individual behavior for the better after going through the learning process.

Many factors affect the low learning outcomes of students, including internal factors, external factors, and learning approach factors(Meliana et al., 2023). Internal factors (factors from within students) are the physical and spiritual state of students, which consists of two aspects, namely physiological, which is physical and psychological aspects of students, are spiritual, including student intelligence (intelligence), student attitude, student talent, student interest, and student motivation. Meanwhile, external factors (factors from outside the student) are conditions that come from outside the student, consisting of the family environment, school environment, and community environment.According to Goleman (2015: 42)in the(Setyawan & Simbolon, 2018)“at its highest, IQ accounts for about 20% of the factors that determine success in life, of which 80% is filled by other forces". One of those other strengths is emotional intelligence or Emotional Quotient (EQ). In the learning process, emotional intelligence is needed by students to understand the lessons delivered by the teacher, because intellect alone cannot function optimally without emotional appreciation in each subject. It has been scientifically proven that emotional intelligence plays an important role in achieving success in all fields, as well as in students to achieve good learning outcomes. Research of(Murtafiah & Firdaus, 2022)provide evidence that there is an influence of emotional intelligence on students' mathematics learning outcomes.

In addition, according to Walgito (in the(Cristin Agstria et al., 2017)) Social interaction is the relationship between individuals and individuals, one individual can affect another individual or vice versa, so there is a reciprocal relationship. Social interaction is the main key in social life, because if there is no social interaction, then there can be no life together. Therefore, social interaction is very important to be taught from an early age. For a student, social interaction is very important in daily life. For example, interaction with teachers, interaction with other friends, and also interaction with the surrounding environment. One of the proofs of social interaction in schools is the influence of reciprocal relationships between teachers and students and students with other students which aims for change for the better. The ability to interact between one student and another student is not the same.

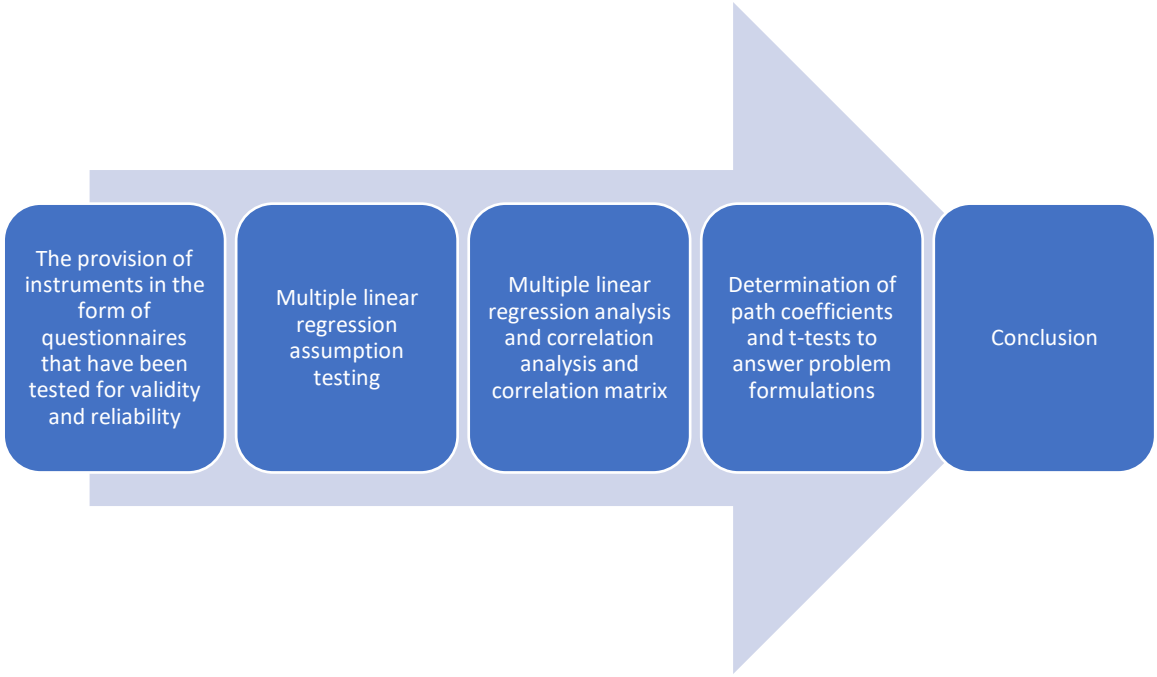
Based on the results of an interview with one of the mathematics teachers at SMA Negeri 2 Kefamenanu, information was obtained that the most prominent factors seen in students were emotional intelligence, learning interests, and social interaction. The emotional intelligence possessed

by students is still very low. This is marked when students cannot control their emotions, so that the student cannot solve the questions given properly. Low emotional control can be seen when students are asked to work on problems in front of or present the results of their work, students tend to be afraid of making mistakes. Students' interest in learning is also very low. This is characterized by most students tending to be lazy in studying and working on problems in mathematics subjects. Students also tend to get discouraged easily when facing math problems. This can be seen during the learning process, as only a few students are active during learning. In addition, students' social interaction in the classroom is also still very low, because students do not get along with friends who have high abilities. When learning is carried out in groups, students only want to group with their classmates or their closest friends.

Some previous research conducted by(Ridwan, 2021)states that there is a relationship between emotional intelligence and student learning achievement. Other research was also conducted by(Ratnasari, 2017)stated that the relationship between the method of learning interest and the mathematics learning achievement of high school students. This study sampled a total of 88 students, using Kendall's Tau nonparametric test, obtained the results that there was a relationship between learning interest and mathematics learning achievement, with a correlation value of -0.012 and a p-value> 0.05 (p = 0.876). Based on these several descriptions, this study was conducted to find out how much the causal influence of social interaction, emotional intelligence, and learning interest on student learning achievement. This research needs to be carried out to develop these three variables to improve student learning outcomes. Therefore, the researcher studied "The Influence of Social Interaction, Emotional Intelligence, and Learning Interest on Students' Mathematics Learning Achievement".

Methods

This type of research is quantitative research with a quantitative survey method, meaning that all information and data obtained when conducting research are represented in the form of numbers analyzed with path analysis statistics. Sugiyono in(Paroli, 2023)states that path analysis is a development of regression analysis, so regression analysis can be said to be a special form of path analysis. Path Analysis is used to describe and test models of relationships between variables that are in the form of causation rather than interactive relationships. In general, the research design is as follows.



Picture 1. Research Design

The population in this study is class X students of SMA Negeri 2 Kefamenanu, which totals 285 students. The sample taken was 167 students in class X. The variables in this study used independent variables and dependent variables. The types of data used in this study are primary data and secondary data. The data collection technique in this study uses questionnaires and documentation. The first research instrument used a questionnaire to measure students' social interactions, learning interests, and emotional intelligence. The determination of the scores of social interactions, learning interests, and emotional intelligence of students is as follows:

Table 1. Alternative Answer Score

Positive Statements Alternative Answer	Score	Negative Statements Alternative Answers	Score
Strongly Agree	4	Strongly Agree	1
Agree	3	Agree	2
Disagree	2	Disagree	3
Strongly Disagree	1	Strongly Disagree	4

Before conducting instrument research, a validity test and reliability test were first carried out. The data analysis technique in this study is to use multiple linear regression prerequisites, namely Normality Test, Homogeneity Test, Multicollinearity Test, and Heteroscedasticity Test. Hypothesis testing is followed by multiple linear regression, testing correlations and looking for path coefficients which is then followed by path analysis.

Results and Discussion

Results

In this study, to obtain data on social interaction, emotional intelligence, and learning interests, the researcher used a questionnaire. As for the data on students' mathematics learning achievement, the researcher took the mathematics Final Exam scores of odd-semester in class X of SMA Negeri 2 Kefamenanu. Before carrying out data collection, a trial of research instruments was carried out,

namely a validity test and a reliability test. The instrument test in this study was carried out in class X of SMA Negeri 2 Kefamenanu by distributing questionnaires to 30 respondents.

After the instrument trial, the next stage of the questionnaire instrument for social interaction, emotional intelligence and learning interests that are valid and reliable is collected in class X of SMA Negeri 2 Kefamenanu. The data analysis used in data collection is as follows:

1. Multiple Regression Equations

Table2. Multiple Linear Regression Test Results

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	75.093	.782		95.972	.000
	SOCIAL INTERACTION	-.014	.019	-.066	-.718	.474
	EMOTIONAL INTELLIGENCE	.011	.015	.079	.738	.462
	LEARNING INTERESTS	.032	.012	.280	2.804	.006

a. Dependent Variable: LEARNING ACHIEVEMENT

The multiple regression equations formed are as follows:

$$Y = 75{,}093 - 0{,}014X_1 + 0{,}011X_2 + 0{,}032X_3$$

2. Correlation Analysis

Tabel 3. Correlation Analysis

Correlations					
		Social Interaction	Emotional Intelligence	Learning Interests	Learning Achievement
Social Interaction	Pearson Correlation	1	.567**	.462**	.109
	Sig. (2-tailed)		.000	.000	.161
	N	167	167	167	167
Emotional Intelligence	Pearson Correlation	.567**	1	.658**	.227**
	Sig. (2-tailed)	.000		.000	.003
	N	167	167	167	167
Learning Interests	Pearson Correlation	.462**	.658**	1	.302**
	Sig. (2-tailed)	.000	.000		.000
	N	167	167	167	167
Learning Achievement	Pearson Correlation	.109	.227**	.302**	1
	Sig. (2-tailed)	.161	.003	.000	
	N	167	167	167	167

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

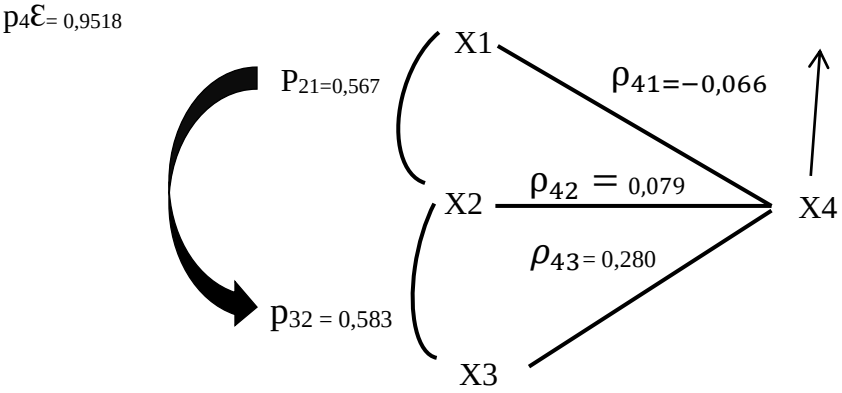
3. Correlation Matrix

Tabel 4.Correlation Matrix

	X1	X2	X3	Y
X1	1	0,567	0, 462	0,109

X2	1	0,658	0,227
X3		1	0,302
Y			1

4. The results of the input of the path coefficient between variables into the analysis design of the path equation model.



5. Analysis of direct and indirect influences in path analysis tables

a. Effect of X1 on X2

1. The influence of X1 on X2 is significant because tcal = 10.726 is greater than ttable (0.05; 167) = 1,654. The direct influence of X1 on X2 = (p221) x 100 = (0.567 x 0.567) x 100 = 0.3214 x 100 = 32.14%.
2. The influence of variables other than the X1 variable on X2 is 100% – 32.14% = 67.86%.
3. The influence of X1 and X2 on X3 against X4 is R123 = 0.3065, R2123 = 0.0940.
4. The direct influence of X1, X2, X3 on X4 is 9.40%, the remaining 90.60% is influenced by other factors.

b. Effect of X2 on X3

1. The direct influence of X2 on X3 , is significant because tcal = 11.328 is greater than ttable (0.05; 167) = 1,654.
2. The direct influence of X2 on X3 is (p232)2 x 100 = (0.583) (0.583) x 100 = 33.98%
3. Indirect influence via X1 = (p32) (r12) (p32) x 100 = (0.583) (0.567) (0.583) x 100 = 19.27%.
4. The total influence of X2 on X3 through X1 is = 33.98 + 19.27 = 53.25%, meaning that the variable X3 is determined by the variable X2 of 53.25%.
5. The influence of variables other than X2 on X3 was 100% - 33.98% = 66.02%.

Further calculations can be made and produce the following Table 5

Tabel 5. Direct and indirect influence

Influence Of variable	Path Coefficient	Influence Direct	Indirect	Total

X_1 terhadap X_2	10,726	32,14%	-	32,14%
X_2 terhadap X_3	11,328	33,98%	19,27%	53,25%
X_1 terhadap X_4	-0,996	43,56%	18,12%	61,68%
X_2 terhadap X_4	1,020	62,41%	25,97%	88,38%
X_3 terhadap X_4	3,900	7,84%	3,26%	11,1%
X_1, X_2, X_3 terhadap X_4		9,4%	-	9,4%

Discussion

1. The Effect of Social Interaction on Emotional Intelligence

To find out the influence of social interaction variables on emotional intelligence variables was carried out with the t-test, from the results of the t-test showed the $t_{\text{calculation value (cv)}}$ = 10,726,t_{table} = 1,654, because$t_{\text{calculation value}} > t_{table}$then it can be declared significant and the direct influence of X_1 on X_2 has a positive value of 0.3214. This means that a one-unit change in the X_1 variable will cause a change of 0.3214 in the X_2 variable. Statistically, this means that social interaction has an impact on emotional intelligence.This is in line with research (Minalloh, 2020)stated that there was a positive and significant influence between Social Interaction on Students' Emotional Intelligence of 0.4282 = 0.1831 or 18.31%. Furthermore, research from Lopes (Metaj-Macula, 2017)shows that good quality of interaction, especially in terms of friendship, gives a high score on emotion management. This shows that good social interaction can increase students' emotional intelligence. This means that there is a direct influence of social interaction on emotional intelligence. Thus, based on this study, it gives results that social interaction has a direct effect on students' emotional intelligence by 32.14%.(Halim, 2024)Research shows that emotional intelligence plays a meaningful role in enhancing math performance among Grade XI students at MAN 1 Medan, explaining 10.2% of their success in the subject.

2. The Effect ofEmotional Intelligenceon Learning Interest

The results of the analysis show that the influence of emotional intelligence variables on learning interest variables is carried out by t-test, from the results of the t-test calculation show the value of t-cv.= 11,328 ,t-table.= 1,654, becauset-cv.>t-table. So it can be stated to be significant, and the direct influence of emotional intelligence on learning interest is 33.98%. This is in line with previous research and also yielded results that are not much different. The results of the study (Risdah Faharuddin, 2019)stated that there was a direct influence of emotional intelligence on learning interest by 43.3%. Based on the results of the analysis, it can be concluded that students who have high emotional intelligence tend to have a better interest in learning. Thus, emotional intelligence has a direct effect on students' learning interest by 33.98%.

The results of the analysis also show that X2 has an indirect influence on X3 through X1. The magnitude of the indirect influence of emotional intelligence on students' learning interests through students' social interaction is 19.27%, meaning that students who have high emotional intelligence tend to be more able to interact, which in the end can increase students' interest in

learning. Thus, emotional intelligence will have an indirect effect on learning interest through social interaction by 19.27%.

Not only that, the study (Marwansyah et al., 2024)even emphasized that these two variables, if properly considered, will help improve student learning outcomes. Therefore, based on the results of this study, it is important for teachers to modify learning according to students' interests, carry out learning with various methods, and teachers also need to keep their emotions from getting angry quickly so that they do not affect students' emotions..

3. The effect of Social Interaction on Learning Achievement

The results of the analysis showed that social interaction had an insignificant influence on students' mathematics learning achievement. This is based on the results of a statistical test using the t-test, which shows that the value of t-cv. = -0.996 is smaller than the table = 1.654. Because t-cv< table, it can be concluded that social interaction insignificantly affects students' mathematics learning achievement, and the direct influence of social interaction on mathematics learning achievement is 43.56%. This is in line with previous research and also gives results that are not much different. The results of the study(Karina et al., 2024)shown that there is social interaction in collaborative learning has a significant positive impact on students' academic achievement.

From the results of the calculation, the direct influence of social interaction on student learning achievement was 43.56%. This means that if students' social interaction increases by 1 unit, the students' learning achievement increases by 43.56%. Based on the results of the analysis, it can be concluded that students who build positive social interaction in the school environment can be an effective strategy to improve students' mathematics learning achievement. One way that can be used to improve student interaction is to provide learning using a cooperative model (Mutmainah et. al, 2025). This will of course, increase social interaction so that it is expected to have a good impact on student learning achievement.

4. The Effect of Emotional Intelligence on Learning Achievement

The results of the analysis showed that the influence of emotional intelligence variables on mathematics learning achievement was carried out with the t-test; the results of the t-test calculation showed the value of t-calculated. = 1,020 ,t-table.= 1,654, because t-cv < t-table. Therefore, it can be declared insignificant, and the direct influence of emotional intelligence on mathematics learning achievement is 62.41%. This is in line with previous research and also gives results that are not much different. The results of the study (Purnama, 2016)There is a direct influence of emotional intelligence on student learning achievement is 17.55%. Based on the results of the analysis, it can be concluded that a change of one unit in the X2 variable will cause a change of 62.41% in the X_4variable.

The results of the analysis also showed that emotional intelligence not only had a direct influence on mathematics learning achievement, but also had an indirect influence through social

interaction and learning interest by 25.97%. The results of the analysis show that the biggest influence of student learning achievement is actually influenced by students' emotional intelligence. Many studies have shown this. One of the studies(Murtafiah & Firdaus, 2022)shows that when compared to intellectual intelligence, emotional intelligence affects student learning achievement more. In his research(Mohebi et al., 2018)also added that by designing emotional intelligence well, updating teaching methods and strategies, it will not only increase emotional intelligence but will also increase students' motivation to learn so that it will have a good impact on student achievement.

5. The Effect of Learning Interest on Learning Achievement

The results of the analysis show that the influence of learning interest variables on mathematics learning achievement is carried out by the t-test, from the results of the t-test calculation show the value of t-cv. = 3,900 ,t-table. = 1.654, because t-cv> t-table. So it can be stated to be significant, and the direct influence of learning interest on mathematics learning achievement is 7.84%. This is in line with previous research and also gives results that are not much different. The results of the study(Alam, 2018)have a direct influence of learning interest with student learning achievement. This is proven by the achievement of an average score of 79,386. Based on the results of the analysis in this study, it can be concluded that a one-unit change in the X_3 variable will cause a change of 7.84% in the X_4 variable.

The results of the analysis also showed that learning interest not only had a direct influence on mathematics learning achievement, but also had an indirect influence through social interaction and emotional intelligence by 3.26%. Although it is seen that learning interest has the least influence on student learning achievement, this learning interest can be increased by improving students' learning methods and strategies. Furthermore, schools need to integrate emotional intelligence into the curriculum or learning (according to the results of this study, emotional intelligence has a considerable influence on students' interest in learning). Thus, it is expected to increase students' interest in learning. Schools need to increase awareness of the importance of these two variables in improving student learning achievement (Mohebi et al., 2018). Another researcher added that, according to thatresearch, students' interest can significantly impact their performance in Mathematics. This suggests that to address poor achievement in the subject, Mathematics teachers should not only focus on teaching methods and instructional materials but also consider students' interest in learning Mathematics as a key factor. Additionally, the study indicates that students' interest in Mathematics may influence their academic performance differently based on gender(Tembe, 2020).

Conclusion

Based on the results and discussion of the influence of social interaction, emotional intelligence, and learning interest on the mathematics learning achievement of SMA Negeri 2 Kefamenanu students, it can be concluded that: The largest influence was produced from the direct influence of emotional intelligence on learning achievement of 62.41%. Furthermore, the social interaction variable on learning achievement had a direct influence of 43.56%. The variable that also gave significant results was the direct influence of emotional intelligence on learning interest by 33.98%. Furthermore, social interaction on emotional intelligence had an influence of 32.14%, and the smallest influence was the direct influence between learning interest on learning achievement of 7.84%.

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