

The Effect of Emotional Quotient, Adversity Quotient, and Mathematical Problem-Solving Ability on Mathematics Learning Outcomes

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Abstract

This study aims to determine the direct influences of the emotional and adversity quotients on learning outcomes and the indirect influence through the mathematical problem-solving abilities of Class XI students at SMA Negeri 16 Makassar. This type of study is quantitative with an ex post facto research design. The population in this study were students of class XI consisting of 6 science classes and 4 social classes; the sample was selected using the cluster proportional random sampling method and obtained 3 science classes and 2 social classes as research samples. Data were collected using test and non-test instruments. The data were analyzed with descriptive and inferential statistics using path analysis techniques. The results showed that the emotional quotient of students was in the medium category, and the adversity quotient of students was in the camper category, while their mathematical problem-solving abilities and mathematics learning outcomes were in a low category. Based on hypothesis tests, it is found that the emotional quotient has a significant direct effect but does not have an indirect effect on mathematics learning outcomes, and the adversity quotient does not have a significant direct or indirect effect on mathematics learning outcomes.

Keywords: emotional quotient; adversity quotient; mathematical problem-solving ability; mathematics learning outcomes.

INTRODUCTION

Success in learning is something that every teacher wants. One way for teachers to see the success of learning is by looking at the learning outcomes achieved by students. Teachers can see the extent to which students understand the material after the material is taught. This is in accordance with what Astika (2017) said: learning outcomes measure students' success and ability in the learning process, whose results can be expressed in the form of numbers. Meanwhile, according to Ramdhani et al. (2020), Mathematics learning outcomes are students' cognitive achievements in achieving the goals that have been set in mathematics lessons after carrying out the learning process determined by test scores or numbers given by the teacher. So that through learning outcomes, teachers can measure the extent to which students' understanding of the material being taught determines the level of student success in learning.

But in reality, many students still get low mathematics learning outcomes; this is obtained after the researchers conducted initial observations and interviews with mathematics teachers at the research location. Based on observations, it is known that most students only get mathematics learning outcomes that are below the standard values determined by the subject teacher, and only a small number of students have been able to achieve the learning outcomes expected by the subject teacher. Of course, this is not in accordance with what is expected by the teacher.

In general, students' learning outcomes in mathematics can be improved. One way to improve it is by knowing the factors that can affect learning outcomes; by knowing these factors, teachers and students

can focus on learning by paying attention to factors that can affect student learning outcomes. Several factors are thought to influence students' mathematical learning achievement, namely mathematical problem-solving ability, emotional quotient, and adversity quotient.

The National Council of Teachers of Mathematics (2000) in learning mathematics sets five standards of mathematical ability that must be possessed by students, namely problem-solving skills (problem-solving), communication skills (communication), connection skills (connection), reasoning abilities (reasoning), and the ability to represent (representation).

Problem-solving ability is one of the important things in learning mathematics that every student must have. Problem-solving (Haji & Widada, 2017) is the process of applying previously acquired knowledge to new, unfamiliar situations. To be able to solve the problem required mathematical problem-solving skills. Mathematical problem-solving ability (Fitri & Hasyim, 2018) is the ability of students to complete or find answers to questions contained in stories, texts, and assignments in mathematics lessons. Problem-solving ability is an ability that must be possessed by students to be able to develop ideas in building new knowledge and developing mathematical skills. Therefore, students need good mathematical problem-solving skills to be able to achieve better learning outcomes.

In learning mathematics, a student cannot be separated from problems because the success or failure of a person in mathematics is marked by the ability to solve the problems he faces. Therefore, one of the things that cause low Student learning outcomes can be caused by the difficulty of students solving problems; the teacher and problems give both math problems. The teacher hopes that students who have difficulty solving problems in class do not lose their enthusiasm and continue trying to find solutions. Experienced by students during the learning process in class.

To be able to solve these problems requires fighting power and an unyielding spirit from students. To achieve maximum results, toughness and fighting power are needed, which are then conceptualized by Stoltz (2000) as intelligence, toughness or fighting power, or the adversity quotient. The adversity quotient (Wang et al., 2021) is the ability to handle adversity or a measure of human resilience. Stoltz (2000) says that individuals with a high adversity quotient can turn obstacles into opportunities because this intelligence determines how far individuals can survive in facing and overcoming difficulties. Likewise, in the learning process in the classroom, students must have high fighting power and remain persistent in completing the tasks given even though they face obstacles when doing these tasks. This shows that adversity can affect students' success in achieving satisfactory learning outcomes.

In addition to the two factors above, other factors can affect the learning outcomes students achieve. Another factor is the emotional quotient of students. Goleman (2001) explains that emotional quotient (Emotional Intelligence) is the ability to recognize our feelings and the feelings of others, motivate ourselves, and process emotions well in ourselves and our relationships with others. In line with that, emotional quotient, according to Bradberry et al. (2009), is your ability to recognize and understand the emotions in yourself and others and use this awareness to manage your behavior and relationships. The emotional quotient is an intangible "thing" within each of us. It influences how we manage behavior, navigates social complexities, and make personal decisions that achieve positive outcomes. In classroom learning, especially in learning mathematics, a student sometimes faces problems related to his activities in class, including understanding the material and doing the assigned tasks. An excellent emotional quotient can help students control their emotions so that these emotions do not negatively impact their learning process in class.

Based on the description above, the researcher conducted research entitled "The Influence of Emotional Quotient, Adversity Quotient, and Mathematical Problem Solving Ability on Mathematics Learning Outcomes of Class XI High School Students."

METHOD

This study type is quantitative with an ex post facto research design. In this study, there are *emotional quotient* (X_1) and *adversity quotient* (X_2), which are exogenous variables, while the variables of

mathematical problem-solving ability (X_3) and mathematics learning outcomes (Y) are endogenous or variables that influenced. The design of this study is as follows:

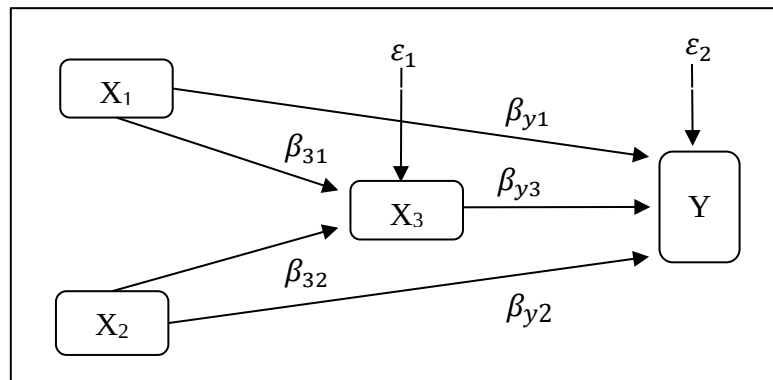


Figure 1 Research Design Using Path Analysis

The structural equation model from the above research is as follows:

$$X_3 = \beta_{31}x_1 + \beta_{32}x_2 + \varepsilon_1 \dots \dots \dots (i)$$

$$Y = \beta_{y1}x_1 + \beta_{y2}x_2 + \beta_{y3}x_3 + \varepsilon_2 \dots (ii)$$

Explanation:

X_1 = Emotional Quotient (EQ)

X_2 = Adversity Quotient (AQ)

X_3 = Mathematical Problem-Solving Ability

Y = Mathematics learning outcomes

ε_1 = Error/Variable Residual

ε_2 = Error/Variable 2

β_{31} = Path Coefficient of X_1 to X_3

β_{32} = Path Coefficient of X_2 to X_3

β_{y1} = Path Coefficient of X_1 to Y

β_{y2} = Path Coefficient of X_2 to Y

β_{y3} = Path Coefficient of X_3 to Y

This research was conducted at SMA Negeri 16 Makassar in class XI with a population of 6 classes XI sciences and 4 classes XI social. The samples in this study were taken using the cluster proportional random sampling technique. The samples obtained were students of class XI IPA 1, XI IPA 2, XI IPA 6, XI IPS 3, and XI IPS 4, with a total of 158 students who became the research sample.

Data collection in this study was carried out by providing research instruments, namely emotional quotient questionnaires, Adversity Response Profile (ARP) questionnaires, mathematics problem-solving ability tests, and mathematics learning outcomes tests that two experts validated.

Furthermore, the data collected is analyzed using data analysis techniques, namely descriptive statistical analysis used to describe each research variable and inferential statistical analysis used to test research hypotheses. The analytical method used in this study is quantitative analysis with path analysis. At the 95% confidence level ($\alpha = 0.05$). Before conducting the path analysis, it is necessary to test the assumptions/preconditions, which include autocorrelation, multicollinearity, and heteroscedasticity tests.

RESULTS AND DISCUSSION

Results

Based on the results of data analysis for the variables of mathematical problem-solving ability and mathematics learning outcomes (as shown in Tables 1, 2, 3, and 4), it is known that the average is 47.8110 and 44.3044 so that in general, these two variables are in a low category. This shows that students still have difficulty facing math problems closely related to understanding the problem, planning the solution of the problem, finding solutions, and re-examining the answers obtained from the problem-solving process and students' understanding of the mathematics material that has been taught is still low.

Table 1. Mathematics Learning Outcome Statistics Score

Statistical	Values
Sample Size (n)	158
Highest score ($X_{\max}$)	94
The lowest score ($X_{\min}$)	6
Average score ($\bar{x}$)	44.3044
Standard deviation (s)	22.52013
Variance (s^2)	507.163

Table 2. Distribution of Frequency and Percentage of Scores Learning Outcomes Mathematics

Interval Value	Category	Frequency	Percentage (%)
0 – 34	Very Low	62	39.24%
35 – 54	Low	46	29.11%
55 – 74	Medium	19	12.03%
75 – 84	High	23	15.56%
85 – 100	Very High	8	4.06%
Total		158	100%

Table 3. Mathematical Problem-Solving Ability Statistics Scores

Statistical	Values
Size Statistics (n)	158
Highest score ($X_{\max}$)	90.22
The lowest score ($X_{\min}$)	8.44
Average score ($\bar{x}$)	47.8110
Standard deviation (s)	16.30251
Variance (s^2)	265.772

Table 4. Distribution of Frequency and Percentage of Scores on Mathematical Problem-Solving Ability

Interval	Category	Frequency	Percentage (%)
0 – 34	Very Low	34	21.52%
35 – 54	Low	78	49.37%
55 – 74	Moderate	22	13.92%
75 – 84	High	21	13.29%
85 – 100	Very High	3	1.90%
Total		158	100%

Table 5 shows the emotional quotient statistics of the students. In general, it is known that the average emotional quotient of students is 112.9406, which indicates that, in general, the emotional quotient is in the medium category. This shows that students still need to learn to control their emotions during the mathematics learning process. Based on the opinion of Goleman (2001) says that emotional intelligence is the ability to recognize feelings and control these feelings in depth so that it can help to develop emotions intellectually so; that in general, by having a high emotional quotient, students will have good abilities in controlling negative emotions they feel when studying so that by controlling these emotions students can focus more when studying to achieve their goals in learning.

Table 5. Emotional Quotient Statistics

Statistical	Values
Size Statistics (n)	158
Highest score ($X_{\max}$)	140.22
The lowest score ($X_{\min}$)	81.23
Average score ($\bar{x}$)	112.9406
Standard deviation (s)	11.25652
Variance (s^2)	126.709

Table 6. Distribution of Frequency and Percentage Score Emotional Quotient

Interval Value	Category	Frequency	Percentage (%)
$score \leq 96,16288$	Very Low	10	6.33%
$96,16288 < score \leq 107.48879$	Low	39	24.68 %
$107.48879 < score \leq 118.8347$	Medium	63	39.87 %
$118.8347 < score \leq 130.14066$	High	35	22.15%
$130.14066 < score$	Very High	11	6.96%
Total		158	100%

In the adversity quotient variable, it is known that the average score is 128.4747, so in general, the students' adversity quotient is in the camper category. This shows that students will try to solve the problems they face during the learning process but only use some of their abilities. This is in accordance with what Stoltz (2000) said, that campers are people who still want to respond to existing challenges but are easily satisfied with what has been achieved. Camper-type students will try to solve problems but do not use all of their abilities. In solving problems, they do not want to take too big a risk and sometimes feel easily satisfied with the results that have been obtained.

Table 7. Adversity Quotient Statistics

Statistical	Values
Sample Size (n)	158
Highest score ($X_{\max}$)	163
The lowest score ($X_{\min}$)	84
Average score ($\bar{x}$)	128.4747
Standard deviation (s)	17,83495
Variance (s^2)	318.085

Table 8. Frequency Distribution and Percentage of Adversity Quotient

Interval Value	Category	Frequency	Percentage (%)
$0 score < 60$	Quitter	0	0%
$60 score < 95$		4	4.33 %
$95 score < 134$	Camper	98	62.03 %
$134 score < 166$		53	31.74 %
$166 score \leq 200$	Climber	3	1.90 %
Total		158	100%

Results of Inferential Statistical Analysis

Furthermore, based on table 9, it is found that X_1 has a significant value of 0.203, which is greater than the alpha value of 0.05, which indicates that *emotional quotients* do not have a direct influence on problem-solving abilities; on the other hand, X_3 also does not have a direct influence on Y . Thus, the *emotional quotient* cannot have an indirect influence on students' mathematics learning outcomes after going through the variable mathematical problem-solving ability. This shows that even though students have a good ability to control their emotions when facing a math problem, it will not have an impact on increasing students' mathematics learning outcomes.

Table 9. Results of the First Substructural Test

Independent Variable	Standardized Coefficient beta	T	Sig. coefficient	R^2	F	Sig. Anova
X_1	0.102	1.279	0.203	0.051	4.170	0.017
X_2	2.273	0.182	0.024			

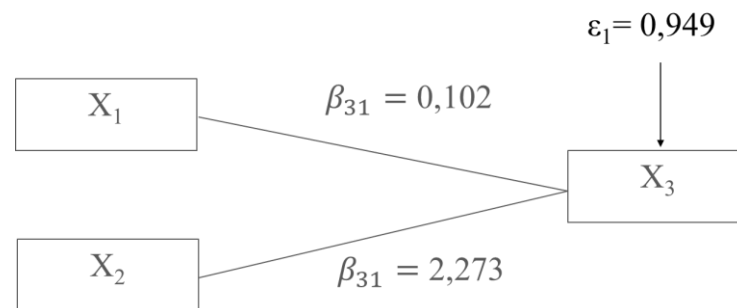


Figure 2. First Substructural Test

Table 10. Results of the Second Substructural Test

Independent Variable	Standardized Coefficient beta	T	Sig. Coefficient	R^2	F	Sig. Anova
X_1	0.318	2.776	0.006	0.112	6.498	0.000
X_2	0.143	1.925	0.056			
X_3	0.210	1.541	0.125			

Table 10 shows that *the emotional quotient* has a significant value of 0.006, which is smaller than the alpha value of 0.05, so it can be concluded that the *emotional quotient* positively affects students' mathematics learning outcomes. Thus, students who can control their emotions during the learning process can help them achieve better mathematics learning outcomes. This is in line with research conducted by Putri et al. (2020) and Anggraini et al. (2022) show that there is a significant influence between students' emotional intelligence on mathematics learning outcomes.

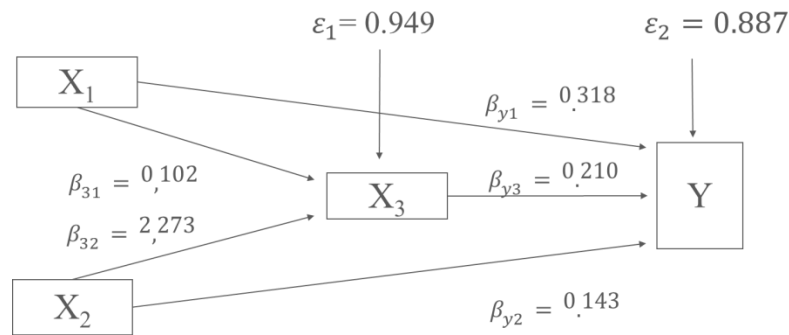


Figure 3. The Second Substructural Test

Based on the results of regression analysis of each sub-structural obtained:

$$X_3 = 0.102X_1 + 0.182X_2 + 0.974$$

$$Y = 0.318X_1 + 0.143X_2 + 0.210X_3(0.102X_1 + 0.182X_2) + 0.942$$

X_2 and X_3 have a significant value of 0.056 and 0.125, respectively, which is greater than the alpha of 0.05, so the *adversity quotient* and mathematical problem-solving ability do not positively influence students' mathematics learning outcomes. This result is not in line with the research conducted by Muhayana et al. (2021), which shows that there is a strong influence of *adversity quotient* on mathematics learning outcomes, and is not in line with the opinion of Rismen et al. (2020) which states that problem-solving ability is the individual's ability to find a way out of the problems or difficulties encountered to achieve maximum learning outcomes.

As for X_2 has a significance value of 0.024 which is smaller than the alpha value of 0.05, this indicates that the *adversity quotient* has a direct effect on mathematical problem-solving abilities, but table 10 shows that problem-solving abilities do not have a direct influence on learning outcomes. Thus, the *adversity quotient* does not indirectly affect students' mathematics learning outcomes after going through the mathematical problem-solving ability variable. This shows that although students have the persistence and toughness to solve the math problems they face, it still has not been able to have an effect on increasing Students' learning outcomes.

CONCLUSION

Based on the results of research and discussion, it can be concluded that: *Adversity quotient* and *emotional quotient* of class XI high school students based on the average value are in the medium category, while for problem-solving abilities and learning outcomes of students based on the average value are in a low category. While the Emotional quotient has a significant direct effect on mathematics learning outcomes but does not indirectly affect mathematics learning outcomes through mathematical problem-solving abilities. In addition, the Adversity quotient does not directly impact mathematics learning outcomes. Also, it does not indirectly affect mathematics learning outcomes through mathematical problem-solving abilities. Furthermore, Mathematical problem-solving ability does not directly affect students' mathematics learning outcomes.

REFERENCES

- Anggraini, T. P., Abbas, N., Oroh, F. A., & Pauweni, K. A. Y. (2022). Pengaruh Kecerdasan Emosional dan Motivasi Belajar Terhadap Hasil Belajar Matematika Siswa. *Jambura Journal of Mathematics Education*, 3(1), 1–9. <https://doi.org/10.34312/jmathedu.v3i1.11807>
- Astika, R. (2017). *Pengaruh Gaya Belajar Terhadap Prestasi Belajar Siswa pada Mata Pelajaran Matematika*. Iain Tulungagung.
- Bradberry, T., Greaves, J., & Lencioni, P. (2009). *Emotional intelligence 2.0*. TalentSmart.
- Fitri, L., & Hasyim, M. (2018). Pengaruh kemampuan disposisi matematis, koneksi matematis, dan penalaran matematis terhadap kemampuan pemecahan masalah matematika. *JP2M (Jurnal Pendidikan dan Pembelajaran Matematika)*, 4(1), 47. <https://doi.org/10.29100/jp2m.v4i1.1778>
- Goleman, D. (2001). *Kecerdasan emosional*. PT Gramedia Pustaka Utama.
- Haji, S., & Widada, W. (2017). *Pengaruh pendekatan saintifik pada pembelajaran matematika terhadap kemampuan pemecahan masalah dan kemampuan berpikir tingkat tinggi siswa kelas x ipa sma negeri 1 kepahiang*. 2(1), 22.
- Muhayana, I., Sridana, N., Prayitno, S., & Amrullah, A. (2021). Pengaruh Adversity Quotient Terhadap Hasil Belajar Matematika SMPN 1 Narmada Tahun Ajaran 2019/2020. *Griya Journal of Mathematics Education and Application*, 1(2), 132–141. <https://doi.org/10.29303/griya.v1i2.40>
- National Council of Teachers of Mathematics (Ed.). (2000). *Principles and standards for school mathematics*. National Council of Teachers of Mathematics.
- Putri, K. P., Hendrowati, T. Y., & Istiani, A. (2020). Pengaruh kecerdasan emosional dan disiplin belajar terhadap hasil belajar matematika peserta didik. *JURNAL e-DuMath*, 6(2), 73–82. <https://doi.org/10.52657/je.v6i2.1286>
- Ramdhani, T., Suharta, I. G. P., & Sudiarta, I. G. P. (2020). Pengaruh model pembelajaran hybrid learning berbantuan schoology untuk meningkatkan prestasi belajar matematika siswa kelas xi sman 2 singaraja. *Jurnal Pendidikan Matematika Undiksha*, 11(2), 7.
- Rismen, S., Juwita, R., & Devinda, U. (2020). Analisis Kemampuan Pemecahan Masalah Matematika Siswa Ditinjau dari Gaya Kognitif Impulsif. *Jurnal Gantang*, 5(1), 61–68. <https://doi.org/10.31629/jg.v5i1.1579>
- Stoltz, P. G. (2000). *Adversity quotient: Turning obstacles into opportunities = Adversity quotient: mengubah hambatan menjadi peluang*. Grasindo.
- Wang, X., Liu, M., Tee, S., & Dai, H. (2021). Analysis of adversity quotient of nursing students in Macao: A cross-section and correlation study. *International Journal of Nursing Sciences*, 8(2), 204–209. <https://doi.org/10.1016/j.ijnss.2021.02.003>