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## Adversity Quotient and Learning Interests To Mathematics Learning Achievement

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**Abstrak.** Terdapat beberapa factor yang memengaruhi prestasi belajar matematika. Factor tersebut diantaranya adversity quotient dan minat belajar. Tujuan penelitian ini untuk mengetahui hubungan Adversity Quotient (AQ) dan minat belajar terhadap prestasi belajar matematika, serta faktor yang paling mempengaruhi prestasi belajar matematika. Penelitian ini adalah penelitian kuantitatif ex-post facto, dengan menggunakan angket dan dokumentasi. Populasi dalam penelitian ini adalah seluruh siswa kelas XI di salah satu SMK Negeri di Palopo, dengan sampel sebesar 76 siswa. Teknik analisis yang digunakan adalah dengan metode analisis Structural Equation Model (SEM) berbantuan aplikasi AMOS 24. Hasil penelitian menunjukkan bahwa ada hubungan *Adversity Quotient* dan minat belajar terhadap prestasi belajar matematika siswa kelas XI SMK Negeri Palopo secara simultan. Variabel *Adversity Quotient* dan minat belajar berhubungan positif dan signifikan terhadap prestasi belajar ( $p_{value} < 0.05$ ). Variabel confidence memiliki hubungan yang paling besar yaitu 0,508 sedangkan hubungan yang paling kecil ditunjukkan oleh hubungan antara Interest dan Liveliness terhadap prestasi dengan koefisien 0,227. Dengan demikian, dalam meningkatkan prestasi belajar matematika siswa, tidak cukup hanya dengan minat melainkan membutuhkan adversity question terutama aspek kepercayaan diri.

**Kata Kunci:** Adversity Quotient, Minat Belajar, Prestasi Belajar.

**Abstract.** Several factors affect learning achievement in mathematics. These factors include adversity quotient and interest in learning. The purpose of this study is to determine the relationship between Adversity Quotient (AQ) and interest in learning on math learning achievement, as well as the factors that most influence math learning achievement. This research is an ex-post facto quantitative study, using a questionnaire and documentation. The population in this study were all students of class XI Vocational high school in Palopo city, with a sample of 76 students. The



1 analytical technique used is the Structural Equation Model (SEM) analysis method assisted by the AMOS 24 application. The results show that there is a relationship between Adversity Quotient and interest in learning towards achievement. Simultaneously learning mathematics from class XI students of Vocational high school 2 Palopo. The variable AQ and interest in learning were positively and significantly related to learning achievement ( $p_{value} < 0.05$ ). The confidence variable has the greatest relationship, namely 0.508, while the smallest relationship is shown by the relationship between Interest and Liveliness on achievement with a coefficient of 0.227. Thus, in improving students' mathematics learning achievement, interest is not enough but requires an AQ especially aspects of self-confidence.

**Keywords:** Adversity Quotient, Learning achievement, Learning interest.

## 1 Introduction

Basically, mathematics learning achievement is influenced by various factors including internal factors, external factors, and learning approaches (U.S., 2015). In this case, one of the internal factors is the Adversity Quotient and interest in learning. Adversity Quotient (AQ) is a form of intelligence other than Intelligence Quotient (IQ), Spiritual Quotient (SQ), and Emotional Quotient (EQ). Darmawan, Budiyono, & Pratiwi (2019) state that the four types of intelligence are interrelated and contribute greatly to each other in an effort to achieve success. This shows that learning does not only requires intellectual, emotional, and social intelligence but also requires intelligence in facing difficulties. Where the intelligence in question is Adversity Quotient (AQ).

Adversity quotient is often referred to as tenacity, greatly influence learning success (Nurhayati & Fajrianti, 2015; Qondias, 2016; Wardiana et al., 2014). There are several things that affect a person's AQ, including self-confidence, achievement motivation, self-esteem, and a sense of responsibility (Pangma et al., 2009). Operationally, AQ consists of 4 constructs that will determine a person's AQ level, namely control, ownership, reach, and endurance (Cornista & Macasaet, 2013). Control refers to the amount of control a person feels over an adverse event or situation. Someone with high AQ will feel control over the events that occur than those who have a low AQ so prefer actions that produce more control. Ownership is related to how someone looks for the causes of problems and how someone addresses these problems. A person with a lower AQ blames himself more without thinking about external causes. Ownership measures the extent to which a person is responsible for the difficulties faced and becomes a measure of the possibility of taking action. Meanwhile, endurance is a measure of a person's endurance which reviews how long the difficulties and their causes will last in a person's life.

AQ intelligence can predict a person's resilience and persistence in facing a challenge and then can turn it into an opportunity for greater achievement such as learning achievement (Effendi et al., 2015). AQ is used to understand a person's adaptation to challenges or difficulties and encourage them to maximize their potential to aggressively face challenges and meet expectations (Shen, 2014). In this case, AQ influences one's coping strategy in responding to the difficulties experienced by immediately overcoming problems and building self-confidence so that after passing these challenges a person becomes a more resilient person (Vinas & Aquino-malabanan, 2015). Furthermore, coping strategies will increase a person's motivation in facing challenges. Achievement motivation itself can be interpreted as a tendency or encouragement to endure a task that may be difficult or demanding to succeed, excel or achieve mastery (Thomas, 2012).

Apart from AQ, interest in learning also affects learning achievement (Islamiah, 2019). Interests are acceptance between oneself and other things outside of oneself, be it people, objects, situations or activities (Siagian, 2013). Interest increases when the relationship between oneself and the object is further strengthened, as well as with students' interest in learning. Interest is very influential on the learning process, because there is no attraction for him to take part in (Subini, 2011). When students are interested in a subject, the student is more involved in the learning process, and looks for more and more information. easily stored (Dan & Todd, 2014). Therefore interest is very important for a student, where interest can facilitate the creation of concentration, and the inherent lesson in students.

Based on the results of observations made by researchers at Vocational High School in Palopo City, there are student problems related to interest in learning. Boredom can be seen after trying two alternative solutions to the quadratic equation problems given by the teacher, but they haven't gotten the correct results. In addition, the results of preliminary observations also show the same problem with solving 2-variable linear equations that require several solutions. From the interview results, students felt that their concentration was often divided and distracted by other problems. Based on the results of an interview with a math teacher HN (37 years old), "students are actually bored when comparing with other alternatives to get results. For example, students who have quadratic equations have alternative solutions to four." From the results of interviews with teachers, it was also obtained information that always found it difficult to calculate, especially on trigonometry, integral derivatives, and limits. "From the problem analysis, it is found that the main cause of the problem is a high level of accuracy and concentration in solving problems that

tend to be long. On the other hand, mathematics learning achievement obtained by students is still low and has not reached the established learning standards. Referring to the mathematics learning achievement, it is known that the influence of students' interest in learning and AQ on mathematics learning achievement is significant to be studied at every level.

Beliefs and perceptions of one's own abilities affect one's motivation. A person chooses how to act or refrain or even survive in the learning process to achieve a certain goal influenced by motivation (Erten & Burden, 2014). In other words, motivation determines one's steps in action. Self-motivation is obtained from students' interest and self-efficacy (Rotgans & Schmidt, 2011). The success of students in the teaching and learning process also depends on how these students are able to be consistent. Students who are consistent will be able to adjust their attitudes and behaviors to the expected goals.

The real manifestation of talents and abilities is an achievement because talent and ability determine one's achievement. People who have mathematical talent can be predicted to be able to achieve outstanding achievements in the field of mathematics. The outstanding achievements in mathematics are a reflection of the special talents possessed in that field. This means that the learning achievements obtained by these students are below the potential or intellectual talents they actually have. Therefore, to get an achievement it takes hard work. Several previous studies have examined the relationship between AQ and interest in learning on student achievement. Among them, the study of the determination between AQ and social studies learning outcomes by Qondias (2016) found that social studies learning outcomes were directly contributed by AQ with a determination value of 11.3%. Nurhayati & Fajrianti (2015) research examines the effect of adversity quotient and achievement motivation on students' mathematics learning achievement. Research on the relationship between adversity quotient and interest in learning mathematics in Class V SD conducted by Wardiana et. al (2014). In this study, it was found that AQ and interest in learning have an influence on the mathematics learning achievement of grade V SD students. Research on the relationship between adversity quotient and interest in learning on mathematics learning outcomes for Class XI IPA by Arby & Ariyanto (2016) also obtained the same results, namely AQ and interest in learning affected student mathematics learning outcomes. However, no one has examined the relationship between AQ and interest in learning on mathematics learning achievement of Vocational high school students. In contrast to previous studies, this study examines AQ and interest in learning at the Vocational high school level using SEM analysis. The

analysis was carried out on each indicator of AQ and interest in learning to obtain more specific results.

Based on the description of these problems, this study aims to determine the relationship between Adversity Quotient and interest in learning towards learning achievement, as well as the factors that most influence learning achievement. This research will be input for teachers and education stakeholders in improving student math achievement.

### Method

The method used in this research is ex-post facto research with a quantitative approach. The population in this study were students of Vocational high school in Palopo city, while the sample in this study as many as 76 students. Samples were obtained by random sampling method and Slovin formula with an error of 0.05. The instrument in this study used a questionnaire and student scores. There are 2 types of questionnaires, namely, Adversity Quotient (AQ) and student interest in learning, the measuring tool used is the Likert scale. The answer category consists of 5 alternative answer choices, namely: Always (S), Often (Sr), Sometimes (KK), Rarely (J), and Never (TP). The scale of the statement about Adversity Quotient (AQ) and student interest in learning for each item is given according to the student's choice, namely for positive statements the score is S = 5, Sr = 4, KK = 3, J = 2 and TP = 1 while for The negative statement score is TP = 5, J = 4, KK = 3, Sr = 2 and S = 1. The questionnaire indicators can be seen in table 1.

Table 1. Indicators of the Adversity Quotient (AQ) Questionnaire and Learning Interests

No.	Questionnaire Indicators	
	Adversity Quotient (AQ)	Learning Interest
1	Achievement motivation (X11)	Interest (X21)
2	To be responsible (X12)	Attention (X22)
3	Confidence (X13)	Liveliness (X23)

From these indicators, it is derived into statement items with 10 each variable, consisting of 5 negative statements and 5 positive statements. In order to validate this questionnaire, Alken's statistical formula was used and the instrument reliability test used the Alpha Cronbach formula. The results of the validity calculation show that the mean value of validity is 0.78. This means that the Adversity Quotient questionnaire and interest in learning have a very adequate level of validity (Valid). Reliability results show that for the Adversity Quotient questionnaire, the coefficient R11 = 0.264, while for the interest in learning questionnaire, the coefficient R11 = 0.219. Because the two variables have an R11 value greater than  $r_{table} = 0.190$ , the questionnaire item

is said to be reliable. Apart from using a questionnaire, researchers also collected data with documentation. The purpose of this is to obtain direct data from Vocational high school in Palopo City which includes: the total number of students, and the daily test scores of class XI students. Before use, the questionnaire instrument is validated by an expert.

The data were analyzed using the structural equation model (SEM) method with AMOS 24 application. The analysis included descriptive statistical analysis, inferential statistics (Normality Test, Linearity Test, Multicollinearity Test, Heteroscedasticity Test, Autocorrelation Test, Chi-square, Relative Chi-Square, Root Mean Square of Approximation, Toker Lewis Index, Comparative Fit Index, research hypothesis test: multiple correlation statistics). Descriptive statistical analysis is intended to describe data collection, data preparation, data processing, and presentation. Data in tabular form, in order to provide an orderly, concise and clear picture of a situation or event.

Before testing the hypothesis in SEM analysis, it is done first; (1) data validity and reliability (2) normality test and (3) multicollinearity test. The results of validity and reliability testing were carried out using confirmatory factor analysis on each latent variable such as X11, X12, X13, X21, X22, X23. Based on the test results, the six variables are declared valid and reliable, marked by a cut of value of the construct reliability of at least 0.7.

Normality testing of data on all variables, both univariate and multivariate, can be seen in skewness and kurtosis. Statistically, it is described that the data is normal if the critical ratio (CR) is between -1.96 and 1.96, thus the overall data on all the variables of this study are said to be normally distributed because the CR value is 1.851. In addition, the Z score for each data was not found outliers, namely z-score  $\geq 3.0$ . The results of multicollinearity testing on this data were found that all correlation coefficients against indicators were below 0.85. The linearity test results show a linear relationship between the dependent and independent variables, which is indicated by the significance value through the F test  $\geq 0.05$ . The results of the Durbin Watson autocorrelation test showed that there was no autocorrelation symptom. It was indicated by the Durbin Watson value of 1,837 being between du (1.8264) and 4-du (2.1754) for (6;177). The results of the Heteroscedasticity test (Glejser) showed that there were no symptoms of heteroscedasticity with a significance value of  $>0.05$ .

**1**  
**Result**

The resulting model construction is based on the concept, obtained a description of the relationship between variables designed in hypothesis testing. The picture in question is presented as follows Figure 1.

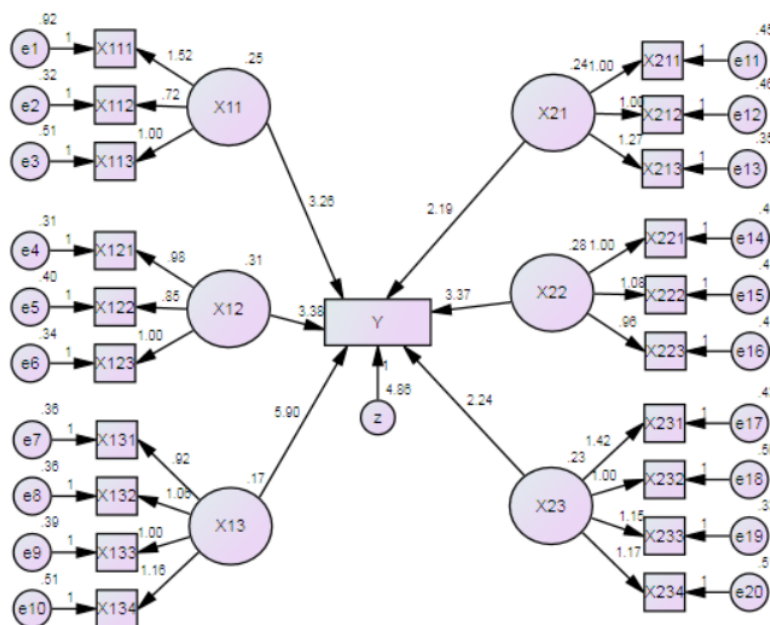


Figure 1 Structural model of the influence between late-stage variables

Based on the parameter estimation results (regression weight or loading factor) shown in Figure 1 through the maximum likelihood method, a model that describes the relationship between Achievement motivational (X11), Responsible (X12), Confidence (X13), Interest (X21), Attention (X22), Liveliness (X23) and learning achievement (Y). The model can be used as a benchmark in estimating this parameter because the model has shown an overall fit index that is acceptable and fits the situation. It can be seen from the chi-square, CFI and TLI values which provide support for model fit, as shown in Table 2. In addition, Figure 1 shows the coefficient of influence between variables which is specifically shown in Table 3.

Table 2 Goodness of Fit Index

Criteria	Cut off Value	Result	Information
Chi-square	Small expect	731.613	Fit
Relative Chi-Square	≤ 2,00	1,317	Fit
RMSEA	≤ 0,08	0,061	Fit
TLI	≥ 0,95	0,963	Fit
CFI	≥ 0,95	0,970	Fit
	Information		Fit



Based on table 2, all the goodness of fit criteria from the tested model consisting of 7 criteria have met the requirements. Thus the model developed meets the criteria so that no modification is made and can be accepted or the model fits the data. Referring to model construction, the next step is to look at the relationship between variables (referring to hypothesis testing). This was done to test the significance of the relationship between variables. The test results are presented as follows.

Table 3. The results of testing the relationship between variables

	Variable	Estimate	S.E.	C.R.	Significant Probability	Information
Y	<-- X11	3.264	.820	3.981	***	Significant
Y	<-- X12	3.380	.642	5.262	***	Significant
Y	<-- X23	2.239	.663	3.377	***	Significant
Y	<-- X22	3.368	.714	4.717	***	Significant
Y	<-- X21	2.193	.683	3.209	.001	Significant
Y	<-- X13	5.901	1.150	5.133	***	Significant

Referring to table 3, all probability (P value) of the tested relationships have a value  $< 0.05$ . This result shows that the relationship between variables has an influence. This research is in line with the findings of Rukmana, Hasbi, & Paloloang (2016) who found that students' AQ in learning certainly has an effect on their mathematics learning outcomes, because in learning mathematics students are required to be able to solve math problems related to life. The same thing was expressed by Qondias (2016) who stated that student learning outcomes were directly contributed by the adversity quotient. Students with high AQ in learning, especially in mathematics, will do more effort and motivation than those who have low AQ (Nurhayati & Fajrianti, 2015; U.S., 2015). This is what leads students to better and more satisfying achievement or learning outcomes. This is reinforced by the opinion that AQ intelligence helps a person face various challenges in life so that they can survive and achieve success (Santos, 2012).

Masfingat (2013) said that Adversity Quotient (AQ) affects students' thought processes in solving math problems so that in AQ learning students need to be considered. Student's thinking process in solving math problems varies according to their AQ level. In problem-solving learning it is necessary to emphasize an individual approach based on the AQ level of students. In mathematics learning, students' AQ level is reflected in applying assimilation, accommodation, and abstraction thinking processes in each stage of problem-solving (Sari et al., 2016).

Yanti & Syazali (2016) stated that the greater the AQ value, the greater the intelligence in facing difficulties. Usually those who have high scores, are people who are experienced or have experienced a high level of difficulty but can survive until success. This survivability related to the confidence that students have regarding the control dimension in their AQ intelligence. Students who have self-control in the learning process will have confidence in their abilities to achieve success (Suryadi & Santoso, 2017).

Stoltz argues that students who have high Adversity Quotient (AQ) will direct all the potential they have to achieve or be able to provide the best results, and will always be motivated to achieve (Endah, 2011). They will do the best possible task, including seeking information and taking advantage of the available opportunities in his life. Therefore, students who have high Adversity Quotient will be motivated to achieve the achievements they want to achieve.

The results of this study also show that interest in learning has a significant relationship with learning achievement. Someone who has a high interest in learning will be able to follow the learning process well so that he will be able to produce the best performance in learning, especially in mathematics (Lee et al., 2014).

Anggraini (2013) argues, what attracts and needs children, will attract their attention, thus they will be serious in learning. Thus the learning process will run smoothly if accompanied by an interest in learning so that it can affect the quality of student learning outcomes achievement. Students who have an interest in learning will affect their learning achievement.

The results of the study were also strengthened by research Erten & Burden (2014) in which student interest in learning was directly proportional to student achievement. The existence of an interest in learning that arises from students increases student motivation to study even harder in order to be able to achieve the expected goals. However, to increase student interest in learning, an appropriate learning strategy is needed so that creativity from the teacher is needed to create a conducive learning atmosphere.

Students who are interested in a subject will gain learning achievement. This is related to the motivation they have (Rotgans & Schmidt, 2011). Learning interest directs students to stay focused on learning, do the task as well as possible, persevere and try as much as possible even though they are faced with difficult assignments, are more active in participating in learning and use problem-solving processing strategies to improve conceptual understanding of the material being taught

The results of this study are in line with research conducted by Wardiana et al. (2014) and Arby & Ariyanto (2016) where it was found that learning achievement was influenced by adversity quotient and student interest in learning. AQ is an attitude where a person can withstand difficulties and obstacles when he is experiencing failure. The higher the AQ a student has, the higher the student's resistance if he gets into trouble in his life. While interest is a person's interest in carrying out activities, the higher and increasing, the student will not feel satisfied about what is learned and will continue to learn to fulfill his curiosity. Thus, when a student has AQ and a high interest in learning, the student's learning achievement will also increase. Furthermore, to find out the magnitude of the influence between the variables being tested, it can be seen in table 4 below:

Table 4. Influence coefficients

	Variable	Estimate
Y	<--- X11	.346
Y	<--- X12	.396
Y	<--- X23	.227
Y	<--- X22	.381
Y	<--- X21	.227
Y	<--- X13	.508

Based on table 4, the table shows that the Confidence (X13) variable has the greatest relationship, namely 0.508, while the smallest relationship is shown by the relationship between Interest (X21) and Liveliness (X23) on achievement with a coefficient of 0.227. From these results also indicate that the AQ factor is more influential than the interest factor, this is indicated by the three variables that build AQ have an average coefficient above 0.3. This means that mathematics learning achievement is not enough with interest alone, but requires an adversity question (AQ), especially on self-confidence. This finding is in line with the research of Rustan & Bahru (2018) which shows that student self-confidence has an effect on student academic achievement. The emergence of students' self-confidence creates a sense of security to provoke students to communicate which can be seen from the activity of students in teaching and learning activities (Abdallah & Ahmed, 2015). The disruption of student self-confidence affects student interest and motivation so that academic success is also disrupted (Gormally et al., 2009).

### Conclusion

Adversity Quotient and interest in learning have a positive and significant relationship with learning achievement. The significance value of each AQ variable which includes achievement motivation, responsibility and self-

confidence and interest in learning in the form of interest, attention, and liveliness each has a value of ( $p_{value} < 0.05$ ). This study proves that the confidence variable has the greatest relationship, namely 0.508, while the smallest relationship is shown by the relationship between Interest and Liveliness on achievement with a coefficient of 0.227. This study also shows that AQ is more influential than interest, this is indicated by the three variables that build AQ have an average coefficient above 0.3. Thus, in improving students' mathematics learning achievement, interest is not enough but requires an adversity question (AQ), especially to increase students' self-confidence.

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