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THE EFFECT OF ADVERSITY QUOTIENT ON STUDENTS' MATHEMATICAL PROBLEM SOLVING ABILITY IN PROBLEM BASED LEARNING MODEL WITH EDMODO

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Abstract--- *The development of education which rapidly increases requires students to have good mathematical problem solving ability. A good mathematical problem solving ability can be enhanced with appropriate learning strategies and a compatible media. The aim of this study was to find out and describe the effect of Adversity Quotient and mathematical problem solving ability in Problem Based Learning (PBL) model learning with Edmodo. This study used true experimental design in the form of posttest-only control design and one class as an experimental class. To analyze the data, this study used simple linear regression test. In brief, this study showed that the impact of Adversity Quotient occurred on students' mathematical problem solving ability in PBL learning model with Edmodo.*

Keywords : *mathematical problem solving ability, Problem Based Learning, Edmodo, Adversity Quotient*

I Introduction

According to 2013 curriculum, the aim of mathematics learning is is to develop the abilities of students in which one of them is mathematical problem solving ability. National Council of Teachers of Mathematics (NCTM) (2000) defines five standards for mathematical ability that students must have including problem solving ability, communication, connection, reasoning, and representation. Waluya et al. (2019) confirm that problem solving plays an important role in mathematics education and most of learning occurs as a result of problem solving process. In fact, the result of interview with one of mathematics teachers in SMA Negeri 5 Semarang informs that students' mathematical problem solving ability have not been optimal in arithmetic and geometrical sequence materials. This is proved by the result of National Examination (UN) in 2019 of SMA Negeri 5 Semarang students, the score of problem solving questions related to arithmetic sequence was less than 55% in which 7.21% was for problem solving indicators related to arithmetic sequence.

Therefore, teacher needs to apply an appropriate approach to improve students' problem solving ability. Problem Based Learning (PBL) is believed one of it. PBL is a pedagogical technique that puts learning in the context of complex problem solving, so PBL leads the students to use their knowledge to solve the problems (Hmelo-Silver, 2004). PBL has been used in education to develop students' ability in applying their knowledge collaboratively in their daily life on meaningful problems. Klegeris & Hurren (2011) strengthen that the

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circumstance mentioned happens due to the positive effect of PBL on students' problem solving ability. Additionally, PBL is applied in teaching mathematics to improve students' understanding and ability to apply its concepts in real life (Padmavathy & Mareesh, 2013).

The students' ability to answer questions or solve mathematical problems has different levels of difficulty according to their characteristics. Students can solve problems properly if their ability to solve problems is good. Based on the Regulation of Minister of National Education of Republic of Indonesia Number 21 Year 2016 (Permendiknas, 2016), one positive attitude in mathematics is tough or uneasily to give up in solving problems. Moreover, one of psychological aspects in mathematics is intelligence in facing obstacles or called as Adversity Quotient (Hidayat & Sariningsih, 2018). Adversity Quotient (AQ) is a person's persistence in facing all obstacles come to achieve success (Stoltz, 1997). AQ is divided into three categories, namely low AQ (Quitters), medium AQ (Campers), high AQ (Climbers). Someone who has a high AQ surely will be able to overcome the difficulties and toughly survive in overcoming the problem (Al Kumayi, 2006).

For more, there is interactions between PBL and conventional learning models with AQ in order to improve students' problem solving ability (Sahyar & Fitri, 2017). Hence, AQ has an important role in developing students' mathematical problem solving ability. Regarding the preliminary research, this study is going to find out the impact between AQ and students' mathematical problem solving ability on PBL learning models with Edmodo and describe students' mathematical problem solving ability according to AQ categories.

II Method

This study was a mix method study by combining quantitative and qualitative data (Creswell, 2010). The quantitative research used true experimental design in the form of posttest-only control design with one treatment namely the final test in one experimental class which was randomly chosen. This test was conducted to measure students' mathematical problem solving ability after being given PBL models with Edmodo. According to Kosasih (2014), PBL is a learning model based on the problems faced by students that related the basic competencies studied. The purpose of PBL is students are expected to have problem solving ability and simultaneously develop their ability to actively build their own knowledge. Therefore, students become increasingly skilled in solving problems, both related to academics or their daily lives. The steps of the PBL are presented on the following Figure 1.

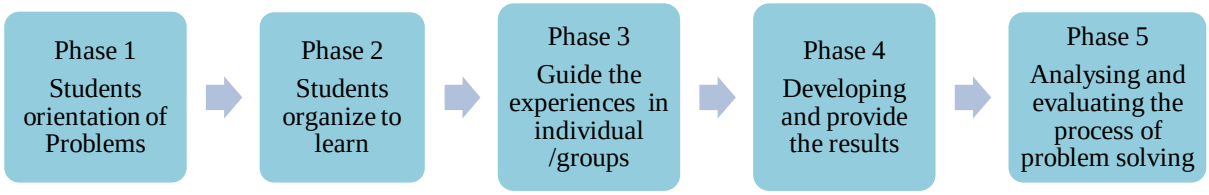

Figure 1. The Steps of PBL

In qualitative study, the selection of subjects used purposive sampling technique. It is a data source collection technique with certain considerations (Sugiyono, 2016). AQ data were obtained by using the Adversity Quotient questionnaire adapted from Stoltz (2000). Meanwhile the result of data analysis of this study results used a simple linear regression test. The hypothesis test used was simple linear regression with prerequisite tests including normality and linearity test.

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III Result and Discussion

Based on data and the analysis of Adversity Quotient questionnaire result that filled out by 35 students, there were 5 students of climber type (high AQ), 27 students of campers type (medium AQ), and 3 students of quitters type (low AQ). Meanwhile, the results of the test data of students' mathematical problem solving ability on PBL learning models with Edmodo can be seen on the following table.

Tabel 1. The Score of Mathematical Problem Solving Ability

Mean	Median	Variance	St. Dev	Min	Max
74.14	76	160.655	12.675	45	95

The next step is testing the hypothesis in order to determine the effect of AQ on students' mathematical problem solving abilities after PBL with edmodo given. The AQ obtained from the Adversity Quotient questionnaire was the independent variable and the mathematical problem-solving ability obtained from final test was the dependent variable. Subsequently, the linearity test was carried out to determine whether there was a linear relationship between the independent and the dependent variables or not. The complete linearity test results can be seen on table 2.

Table 2. The Linearity Test

			Sum of Squares	df	Mean Square	F	Sig.
Score* AQ	Between Groups	Linearity	3816,492	1	3816,492	51,216	,000

The result of anova output was sig. (Linearity) = 0,000 <α = 0.05, so H0 was rejected. Shortly, there was a linear relationship between Adversity Quotient and mathematical problem solving ability, thus the linear regression model could be used. Furthermore, to find out whether the regression coefficient was met or not, the regression coefficient test was conducted. The results are presented on the following table.

Table 3. The Coefficient Test

Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	22,184	7,686		2,886	,007
	AQ	0,434	0,063	0,767	6,874	,000

As showed on table 3, the coefficients output result was sig. (constant) = 0.007 <α = 0.05 and sig. (AQ) = 0,000 <α = 0.05, so H0 was rejected. Hence, the regression coefficient is significant. Since the assumption of linearity modeland the significance of regression coefficients are fulfilled, the linear regression equation could be used. Then, the constant value (Constant) on the output of coefficients was 22.184 and the coefficient b (AQ) was 0.434. The formula of regression equation for the two variables is showed as follows.

$$\hat{Y}=\alpha+\beta X=22,184+0,434\ X$$

Notes: Y is students' mathematical problem solving ability; and X is the Adversity Quotient (AQ).

Furthermore based on the output, the summary model is presented on Table 4.

Table 4. The Summary Model

Model	R	R Square	Adjusted R Square	Std. Estimation Error
1	0,767[a]	0,589	0,576	8,250

Based on table above, the value of correlation coefficient between AQ variable and students' mathematical problem solving ability was 0.767. It means that there was a strong and positive relationship between two of them. The coefficient of AQ determination on problem solving ability was 0.589 (R square) or 58.9%. In other words, the contribution of AQ to the ability to solve mathematical problems was 58.9%.

Related to AQ categories, the result of this study showed that students with climbers AQ had meet all four stages of mathematical problem solving ability, namely understanding the problem, planning the problem solving, carrying out the plan and looking back. Campers AQ students have fulfilled three stages of mathematical problem solving ability, namely understanding the problem, planning the problem solving, and carrying out the plan. Meanwhile Quitters AQ students have fulfilled only one stage namely understanding the problem. Based on the analysis of the problem-solving ability of each categories of AQ, the problem solving ability of quitters students is poor rather than other categories. This happened since quitters students were only able to carry out Polya's problem solving stage, namely understanding the problem.

Moreover, the problom solving ability of campers students was not good enough since they have not been able to apply one indicator namely looking back. While problem solving ability of climbers students was good since they can well applied all indicator of Polya's problem solving stage. If all indicators of problem solving could be implemented well, it went without saying that it has positive impact on students' learning outcomes. Conversely, if all indicators of problem solving could not be implemented properly, then the impact on student learning outcomes was not good. Hidayat & Sariningsih (2018) convey that students of AQ climbers are able to carry out the four stages of Polya in Open Ended Learning in problem solving.

Moreover, the use of Edmodo application as a media for students learning process aimed to make students become more understand the material given. Students got the material which provided by researcher in Edmodo and then did the exercises. Additionally, they got teaching material more easily because it had been shared and can be repeatedly accessed on Edmodo. The training activities on arithmetic sequences in the Edmodo group are shown in Figure 2

Figure 2. Exercises 1

Based on Figure 2, the average score of students' exercises was 84. It means that most students had a good understanding of material sequence and series. While the exercises of geometry sequence and series and application of sequences and series in Edmodo group are showed in Figure 3.

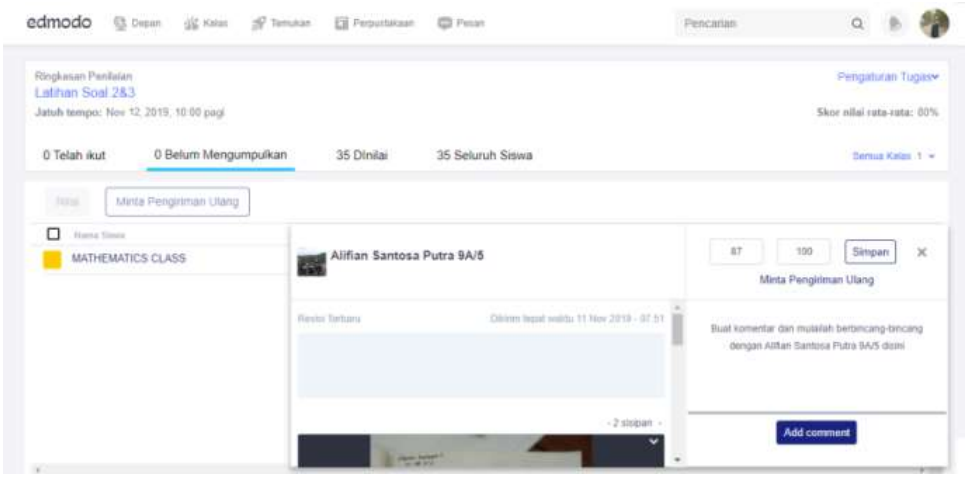

Figure 3. Exercises 2

Figure 3 shows that the average score of students' exercises was 80. In other words, most students have understood the material of geometric sequence and series and the application of sequences well. Based on the results of the analysis, it can be concluded that Edmodo learning had positive effect on students' problem solving ability as well as PBL model since both of them could help students to solve a problem during the learning process. Also, Edmodo helped students to easily interact during the learning process. As Noviyanti et al. (2019) argue that blended learning and e-learning are able to help students in solving a problem in learning problems through Edmodo.

IV Conclusions

Regarding the result and discussion, it can be concluded that Adversity Quotient has a positive effect on students' mathematical problem solving ability in PBL model with Edmodo. Students in climbers categories are able to fulfill all indicators at the stage of mathematical problem solving ability namely understanding the problem, planning the problem solving, carrying out the plan and looking back. Campers students are only able to fulfill 3 indicators, namely understanding the problem, planning the problem solving, and carrying out the plan. Meanwhile, quitters students are only able to fulfill one indicator, namely understanding the problem.

V Suggestion

Based on the conclusions of the research, the researchers suggest the use of Edmodo media in PBL learning models since it facilitates students to easily interact. In division of groups in learning PBL model, do not only consider the students' mathematical problem solving ability, but also consider the students' AQ level due to the difference AQ level will affect students' mathematical problem solving ability.

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