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Mathematics Problem Solving Ability in Terms of *Adversity Quotient* in Problem Based Learning Model With *Peer Feedback*

Maria Naimnule ✉, Kartono, Mohammad Asikin

Universitas Negeri Semarang, Indonesia

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Abstract

This study aimed to describe the ability of students' problem-solving based on adversity quotient. This study is a mixed-method with sequential explanatory design. The subject of the study is the 8th-grade students of SMP Negeri 1 Miomaffo Timur in the school year of 2018/2019 with class VIII A as the experimental class subject to problem-based learning models with peer feedback and class VIII B as the control class subject to discovery learning models. Quantitative data collection was obtained from the test results of the problem-solving ability of material flat side geometry and qualitative data collection was done by interviewing the results of the problem-solving ability tests through a model of problem-based learning with peer feedback. The result revealed that learning model problem based learning with effective peer feedback and a description of problem-solving abilities in terms of adversity quotient in the high, medium and low categories of the problem-based learning model with peer feedback had various results. It is shown from 4 quitter students, there was no high problem-solving ability, 2 students at no medium problem-solving ability and 2 students at low problem-solving ability. From 15 camper students, 6 students have high problem-solving abilities, 7 students have medium problem-solving abilities, and 2 students who have low problem-solving abilities. From 13 climber students, 5 students had high problem-solving abilities, 7 students had medium problem-solving abilities, and 1 student who had low problem-solving abilities.

✉Correspondence:
Kampus Pascasarjana Unnes, Jl. Kelud Utara III Semarang 50237, Indonesia
E-mail: marianaimnule63@gmail.com

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INTRODUCTION

Mathematics is one of the subjects that play an important role in the success of the education program because it is a compulsory subject from elementary to senior high school. Junaedi & Asikin (2012) explained that mathematics must be designed in such a way as to encourage students to have mathematical skills, such as understanding, communication, connections, reasoning, and mathematics problem-solving. Mathematics not only aims to get high grades in examinations or tests, but students should also be an effective problem solver, meaning that they can solve mathematical problems so that they have systematic, logical, and critical thoughts in solving life problems they face outside the classroom.

The ability to solve problems is one of the important competencies achieved by students in mathematics learning. The students' ability to solve mathematics problems in Indonesia is not optimal. This is indicated by several things as follows (1) PISA data for 2000, 2003, 2006, 2009, 2012, Indonesia respectively ranked 39 out of 41 countries, ranked 38 out of 40 countries, ranked 50 out of 57 countries, ranked 61 out of 65 countries, and ranked 64 out of 65 countries. In 2015, Indonesia ranked 61st with a score of 397 out of 70 PISA participating countries, at least there was an increase compared to the previous year; (2) TIMSS 2011 data showed that the average acquisition score in mathematics subjects is in the bottom order. Indonesia was ranked 38 out of 45 countries with a score of 386 from the highest international score of 613 in mathematics as a whole, TIMSS 2015 data is also still ranked below despite an increase that is ranked 45 out of 50 countries, obtaining a score of 397 (Mullis et al., 2015).

The lack of problem-solving skills found in one school of North Central Timor Regency, namely SMP 1 Miomaffo Barat. Based on data obtained from mathematics teachers in class VIII, there were many students are frustrated and had difficulties to work on problem-solving problems. The students' difficulties marked by there were several students that could answer the question. On the answer sheet, students only rewrite the questions given and finished them with false strategy. The teachers also sated that flat side geometry was a difficult material for students. Based on the flat side geometry material daily test in shool year 2017/2018 showed that from 4 class there were 76 of 126 students or 60,31% were not reached the KKM that is 70. The result showed that the students' ability to geometry categorized as low.

Based on the writers' interview with the Math's teacher in the research location, they stated that the students' struggle in Math problem-solving still weak and lack of attention from the teacher because of the lack of teacher's understanding about students' struggle. Teacher more emphasized on delivering the whole material to students. This situation affects on students when finished the test. Students tend to lazy in thinking to solve the problem. This is line with the research from Sakrani (2014) that students tend to stop when they felt that there is no solution from a problem given because they felt that the problem is beyond their ability.

Paul Stolz has introduced a new concept called *Adversity Quotient* (AQ) which described how good someone's ability and struggle in solving a problem (Shivaranjani, 2014). Stolz (Sunandar *et al.*, 2018) stated that not only IQ and EQ as the determiner for success, but *Adversity Quotient* (AQ) also has an important role in realizing success. According to Stoltz (2000), AQ Stoltz (2000), AQ has three categories which divided into the low category as *quitter*, medium category as *camper*, and high category as *climber. Quitters* are the group which refers to people who cannot accept the challenges in their life. *Campers* refer to students or people who had the willingness to face the problems, but they give up because they felt that they are not able to solve the problems. While the *climbers* are people who chose to face the problems.

The low ability to solve mathematical problems can be caused by the learning model used by teachers who have not paid attention to the students' Adversity Quotient for mathematical problems. The Problem Based Learning Model is one of the models that requires student activeness that has an impact on problem-solving abilities because this learning model begins with the presentation of real problems that stimulate students to learn so that students have the opportunity to construct their own knowledge through ideas developed in the form of cooperation with small groups so that the problem faced can be solved (Farhan dan Retnawati, 2014;

Laurensia, 2016; Amperawan *et al.*, 2018). AQ level in students taught with PBL Model with scientific learning achievement is better than the AQ level students who are taught with discovery learning model (Wicaksana *et al.*, 2016). An important part of the education process is feedback. According to Baerh and Bayerlein (Basuki and Hariyanto, 2017: 9) quality assessments must meet the principles of improvement based on feedback from the assessment.

The facts on the ground illustrate that in the learning process, teachers rarely provide feedback at the end of formative tests. The teacher is late giving feedback and often continues learning to the next material without paying attention and fixing how many students still experience errors in the material that has been given. As a result, students still made errors and continue to use the wrong concepts in further learning.

Peer feedback has the potential to stimulate collaborative and social active learning between students to help each other thereby making the learning process more meaningful (Alqassab *et al.,* 2018). By letting students take part in giving feedback, students are trained to use expressing themselves in understandable ways. This is supported by Reinholz (2018) who stated that when students provide feedback, students are faced with an alternative perspective and learn to think more critically about their work.

According to Yusri (2018) the Problem Based Learning (PBL) model is designed in the form of learning that begins with the structure of real problems related to mathematical concepts to be taught, students not only receive information from the teacher but the teacher must motivate and give direction to students so that they were active in the whole learning process. PBL Model syntax can be combined with peer feedback, to support student learning processes. Peer feedback can be inserted at one of the PBL stages to reinforce focusing students' attention in learning PBL models and helping students be active in the learning process and using their thinking power to complete, assess and provide feedback independently and become support in improving students' problem-solving skills.

Based on the explanation above, the objectives of this study are: (1) Testing the problem-solving ability of junior high school students on the application of the problem based learning model with peer feedback achieving completeness criteria; (2) Test the students' problem-solving abilities in applying problem-based learning models with peer feedback is better than students' problem-solving abilities using discovery learning models; (3)Described the problem-solving skills of VIII grade students of SMP Negeri 1 Miomaffo Barat on learning model problem based learning with peer feedback in terms of adversity quotient.

METHOD

The method used in this research is sequential mixed methods of sequential explanatory type (the method of a sequence of evidence) which is a research method that combines quantitative and qualitative research methods sequentially where in the first stage of research conducted with quantitative methods and in the second stage carried out qualitative methods (Sugiyono, 2017).

The study was conducted at SMP Negeri 1 Miomaffo Timur with the population of the study being the eighth-grade junior high school students in the 2018/2019 school year. In quantitative data, the selected research sample consisted of two classes, namely class VIII A and VIII B. Class VIII A as an experimental class was given learning by the PBL model with peer feedback and class VIII B as a control class was given learning by the discussion model. For qualitative data, the research subjects used were only experimental classes in which the selection of research subjects consisted of 32 students, namely students drawn from AQ quitters, campers, and climbers groups with varied mathematical problem-solving abilities.

Quantitative data collection techniques are done by problem-solving tests. Meanwhile, qualitative data collection were done by questionnaire, interview and documentation.Quantitative data were tested using a normality test, homogeneity test, average completeness test, proportion completeness test, and average difference test. While qualitative data analysis follows the concept of Miles & Hubermen Miles and Huberman following what has been explained by Sugiyono (2016: 338) cover data reduction, data display and conclusions.

RESULT AND DISCUSSIONS

From the assessment of learning outcomes obtained that the results of the TPM are normally distributed with a value of sig = 0.061 and homogeneous with a value of sig = 0.336. Based on the results of the calculation of the average completeness of the experimental class used t-test it was obtained that t_{count}= 6,50. In $\alpha = 5\,\%$ was obtained $t_{(1-\alpha)} = t_{(0,95)(31)} = 1{,}695$. Because $t_{count} > t_{table}$ then H_0 rejected and H_1 received. Therefore, based on the research result it can be conclude that that the average problem-solving ability in the classes taught by PBL models with peer feedback is more than 67. Based on the results of calculations using the right-side proportion test obtained Z_{count}=1,78. In $\alpha = 5\,\%$ obtained $z_{0,5-\alpha}$ = 1,64 . Because $Z_{count} > Z_{table}$ then H_0 rejected and H_1 received. So, it can be concluded that the proportion of students completeness in the class taught by PBL models with peer feedback is more than 75%.

Based on the calculation result, the different test results obtained TKPM average t_{count}=3,13. Real degree 5 % and dk= 62 obtained t_{table}= 1,66. Because $t_{count} > t_{table}$ then H_0 rejected and H_1 received. Therefore it can be concluded that students 'mathematical problem-solving abilities in classes taught with PBL models with peer feedback are better than students' mathematics problem-solving abilities in classes taught with discovery learning models. Based on the result of linieritas test with SPSS obtained significance value 0,00= 0% so that H_0 rejected and H_1 received. This shows that the Y variable can be predicted by the X variable. A simple linear regression model between AQ and experimental class problem-solving abilities based on the calculated results with SPSS obtained *a= 56,184* and *b= 0,171* so that simple regeretion linier models between AQ and the ability to solve problem experimental class based on calculation result with SPSS obtained *a=56,184* and *b=0,171*. So the regretionequation is $\hat{Y} = 56{,}184 + 0{,}171X$. The magnitude of the presentation of variable X influences the variable Y expressed by the coefficient of determination of the experimental class based on the results of calculations with SPSS, adversity quotient has a positive effect on the TKPM results in the experimental class by 67.7%%. The results of this study are consistent with research conducted by Lestari, Dwijanto and Hendikawati (2016); Supraptina et al., (2015); Faroh, Sukestiyarno and Junaedi (2014) which states that the PBL model is effective in improving problem-solving abilities.

Peer feedback give positive impact for students to be more active in building their knowledge by giving feedback in order to get new knowledge through the problem. This ios line with the study of Chen Huang (2018) who stated that student involved iin assessment and dan *peer feedback* to involved in task so that be more active in teaching learning process. *Peer feedback* had the important effect for students' achievement (Smith, 2017).

The qualitative research was conducted to described students adversity quotient based on each category. Subject in study were 32 students in class VIII A which were classified into three categories namely climber, camper and quitter. Based on the results of the Adversity Quotient questionnaire in experimental class students obtained the results as can be seen in table 1.

Table 1. The Classification of Class VIII A Students Based on AQ

Students' category	Total Students	Percentage
Quitter	4	12,5 %
Camper	15	46,875 %
Climber	13	40,625 %
Total	32	100 %

From the 32 students in class VIII A who filled out the Adversity Quotient questionnaire there were 13 students in the climber category, 15 students in the camper category, and 4 students in the quitter category. After the research subjects were selected, a description of the mathematics problem-solving ability of students was obtained in terms of the three categories of adversity quotient namely quitter, camper and climber which varied as follows.

Table 2. Results of KPM Analysis Summary in terms of AQ

AQ Category	Problem-solving ability	
	Total student	Category
Quitter	0	High
	2	Medium
	2	Low
Camper	6	High
	7	Medium
	2	Low
Climber	5	High
	7	Medium
	1	Low

Mathematics Problem-solving Ability of Quitter Students

The results of the AQ classification indicate that there are four students in the quitter category. Quitter students have varied mathematical problem-solving abilities. In students with the quitter category, it is known that there were no students who have high problem-solving abilities, but for students who have moderate problem-solving abilities were 2 students and students who have low problem-solving abilities were 2 students.

From the 4 quitter students, 3 stages of problem-solving have been mastered by 2 quitter students namely understanding the problem, arranging the problem-solving process and carrying out the problem-solving but the students are still having trouble checking the results of the problem-solving so that they do not pay attention to the problem-solving steps correctly. For the other 2 quitter students, they can only carry out two stages of problem-solving, namely understanding the problem and compiling a problem-solving plan. Many errors are found in the problem-solving process. At the step of re-checking the four quitter students do not do the step of re-checking the final results of their work nor the steps to solve the problem. This is line with the study from Yani, *et al*, (2015); Darojat dan Kartono (2016) who stated that quitter students still have difficulty in solving problems.

Mathematical Problem-solving Abilities of Camper students

AQ classification results show that there are 15 students in the camper category. Camper students have students' varied mathematical problem-solving abilities. From 15 camper students, 6 students have high problem-solving abilities, 7 students have medium problem-solving abilities, and 2 students who have low problem-solving abilities. Of the 15 students in the camper category, four steps of problem-solving students were able to be mastered by 6 students, for 7 students in the camper category, four steps of problem-solving abilities were able to be implemented well but there were still a few obstacles namely students who were still having difficulty checking return the results of the problem-solving so that it does not pay attention to the troubleshooting steps correctly. For 2 students in the camper category, they have tried to fulfill 3 stages of problem-solving even though the process of solving the problem is not until the final solution. This is in line with what was conveyed in the research of Hidayat and Sariningsih (2018) that students with campers type are less able to check back properly so they cannot detect errors in the process of finding a solution correctly. Some camper students feel they have tried to solve the problem even though it is not perfect, so they did not pay attention to the steps of solving the problem correctly. This is in line with the results of the research of Rosita and Rochmad (2016) camper subjects like to be in the comfort zone and feel satisfied when achieving something but not optimal yet.

The Mathematics Problem-Solving Ability of Climber Students

The results of the AQ classification showed that there were 13 students in the climber category. Based on the results of the analysis it was found that the climber students had varied mathematical problem-solving abilities. From 13 climber students, there are 5 students who have high problem-solving abilities, 7 students who have medium problem-solving abilities, and 1 student who has the low problem-solving ability.

Of the 13 students in the climber category, four steps of problem-solving students were very capable of being mastered by 5 students, for 7 students in the

category of climber three steps of problem-solving ability students were mastered but there were still a few obstacles such as even though the climber students could carry out problem-solving plans well, but there is a slight error in the calculation process. Whereas for 1 student in the category of climber on low problem-solving abilities students still have difficulty in planning problem-solving that is they do not write formulas that will be used in problem-solving so the calculation process is also not quite right. The results of research conducted by (Muna, 2014; Suryapustitarini et al, 2018; Floresta et al, 2015) which stated that climber students could state the steps to solve the problem properly.

CONCLUSION

Based on the analysis and discussion, the conclusion is: the description of students' mathematical problem-solving abilities in terms of adversity quotient shows varying results. This means that students 'adversity quotient does not affect students' mathematical problem-solving abilities. So that learning is needed with PBL models with peer feedback to achieve students' mathematical problem-solving abilities.

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