

Ability in Mathematics Problem Solving Based in Adversity Quotient

Ibnu Malik¹, Mulyono², and Scolastika Mariani²

¹IAIN Syekh Nurjati Cirebon, Jawa Barat, Indonesia

²Universitas Negeri Semarang, Indonesia

E-mail: ibnusmalik@gmail.com¹

Received: March 2019

Accepted: April 2019

Published: May 2019

Abstract

The objective of this research is to know mathematics problem-solving ability viewed from adversity quotient. The research method used in this research is qualitative research method. The population in this research is forty students of the eighth-grade students of SMP Negeri 1 Sumber, Cirebon, West Java, Indonesia. The sampling method used in this research is Purposive Sampling. Data gathering methods consist of test, observation, documentation, questionnaire, and interview. The research shows that quitter students group has not been able to perform all problem-solving steps, including understanding the problem, planning a problem solving, performing the problem solving, and reviewing the answer. Camper students group can perform 75% of the problem-solving steps; they understand the problem, planning a problem solving, performing the problem solving, but not in reviewing the answer. Climber students groups can perform 100% of the problem-solving steps; they understand the problem, planning a problem solving, performing the problem solving, and reviewing the answer.

Keywords: adversity quotient, student problem solving ability, SPLDV

INTRODUCTION

Problem-solving is a very important part of the mathematics curriculum. Students use problem-solving knowledge and skill that they already have to be implemented in the learning process (Misu, 2014). According to NCTM (2000), there are three aspects that students must master in mathematics; they are:

“recognize and use connections among mathematical ideas, understand how mathematical ideas interconnect and build on one another to produce a coherent whole, Recognize and apply mathematics in contexts outside of mathematics.”

In Mathematics, problem-solving is the most important aspect. According to Sari (2016), problem-solving has long been the main attention focus on teaching mathematics at school. Students' ability in problem-solving is the ability to understand the problem, to design mathematics model, to solve the mathematics model, and to interpret the solution they get. Hudojo, as quoted by Darajat, and Kartono (2016), explained that problem-solving had long been the main focus in mathematics learning. Therefore problem-solving has a strong relation to mathematics.

One of Manah research results (2017) shows that the mathematics problem solving ability based on Polya stages for higher students group results that the higher students group can perform the Polya stages well which

consist of understanding problem, planning and performing problem solving, but they have not been able to review as a whole; mathematics problem-solving ability based on Polya stages for *camper* students shows that *camper* students are able to understand problem, but they have not been able to perform the planning, implementing and reviewing stages as a whole; mathematics problem-solving ability based on Polya stages for *quitter* students shows that *quitter* students have not been able to perform all Polya stages.

Awaliyah, Soedjoko, and Isnarto (2017), also gives conclusion from their research that higher group students can understand problem, plan a problem solving, perform the problem-solving planning, and review the results and process, *camper* students have less ability in understanding problem, *quitter* students have less ability in understanding problem and in reviewing the results and process.

According to Abdurrahman as quoted by Hafid, Kartono, and Suhito (2016), students difficulty in learning mathematics is seen from students' mistakes in answering questions. One type of questions in mathematics is problem-solving. In answering a mathematics problem, students have to master the way to apply concepts and computing skill in many different new situations.

Mathematics subject is aimed to make students have ability in (1) understanding ma-

thematics concept, explaining inter-relationship between the concepts and applying the concepts in the right way in problem-solving; (2) using logical reasoning on pattern and characteristic, performing mathematics manipulation in making generalization, arranging proof, or explaining mathematics ideas and statement; (3) solving mathematics problem which consists of ability in understanding problem, planning mathematics model, performing the model and interpret the solution they get; (4) communicating ideas with symbols, tables, charts, or other media to make the problem clearer; (5) having good attitude that they appreciate mathematics usage in life, that they have curiosity, attention, and interest in learning mathematics, and they are tough and have self-confidence in solving problem.

Based on experts opinion about the importance of learning problem solving for students, it can be said that problem solving is a very important part of learning mathematics. This is because one of mathematics learning objectives for students is that they have ability or skill in solving the problem, as a medium to sharpen their logical reasoning to be accurate, logic, critical, analytical, and creative.

Students problem-solving ability in Indonesia is still low. This can be seen based on data from *Programme for International Student Assessment (PISA)* that Indonesian 13-year-old students learning achievement are still low. At PISA year 2000, 2003, 2006, 2009, 2012 consecutively, Indonesia is grade 39 out of 41 countries, grade 38 out of 40 countries, grade 50 out of 57 countries, grade 61 out of 65, and grade 64 out of 65 countries. There was a slight improvement in 2015 compared to previous years, Indonesia is at grade 61 out of 70 PISA participant countries with score 397.

Less ability in problem-solving is seen in one school in Cirebon Regency; it is SMPN 1 Sumber. Based on the average mastery of mathematics in the 2016/2017 National Examination, SMPN 1 Sumber got 32.3% while in national scope it was 37.22%, West Java Province was 40.72%, and Cirebon Regency was 34.14%. Mathematics average score in the National Examination for Cirebon Regency in 2017 was 38.25 (Radar Cirebon). Based on data collected, the result of Mathematics Even Mid Semester Test for the eight grade students in 2016/2017 reached an average of 62.18. This result is still low for it had not reached the minimum completeness score decided by the school which was 75.

Learning success in problem-solving ability is not only affected by someone's IQ and EQ. Stoltz (2005) said that not only IQ or EQ that determined someone's success, but also

Adversity Quotient (AQ) has an extraordinary effect in realizing someone's success.

Besides that, Stoltz (2005) had introduced an interesting new concept, i.e. *Adversity Quotient (AQ)* which described how well someone's ability in handling difficulty. *Adversity Quotient (AQ)* is someone quotient in facing difficulty. The ability in facing difficulty is different for each student. According to Efendi as quoted by Mena, Lukito, and Siswono (2016), AQ is toughness quotient. Therefore AQ has a strong correlation with someone's endurance in facing the problem.

According to Stoltz (2005), *Adversity Quotient (AQ)* has three categories; they are low called as a *quitter*, middle called as a *camper*, and higher called as a *climber*. *Quitter* is a group of people who have less willingness to accept the challenge in their life. A *camper* is a group of people who already have the willingness to try to face existing problem and challenge, but they quit for they feel that they can not afford the *challenge* anymore. *Climber* category is a group of people who choose to keep facing anything that may come, whether it is a problem, challenge, burden, or another thing which keeps coming every day.

Rukmana, Hasbi, and Paloloang (2016) said that AQ students have will determine whether the students can or cannot reach their success in learning. Nurhayati, and Fajrianti (2013) concluded her research that there was a significant influence between *adversity quotient* with mathematics learning achievement in SMA Tugu Ibu 1. Therefore students learning result is determined much by their level of AQ. The higher the students' AQ, the higher their learning result.

Wardiana, Wiarta, and Zulaikha (2014) found that there was a significant correlation between *Adversity Quotient (AQ)* with their mathematics learning interest and result. Utami, Nashori, and Rachmawati (2014) found that *Adversity Quotient (AQ)* affected their learning achievement. Based on those researches it can be concluded that the level of *Adversity Quotient (AQ)* affect students learning the result. One aspect of learning mathematics is the ability to solve the problem. Moreover, the ability to solving the problem is the focus of school mathematics. Therefore, *Adversity Quotient (AQ)* affects students ability in solving the problem. Based on the problem, this research analyzes SMP (Junior High School) students ability in solving mathematics problem viewed from *Adversity Quotient*.

METHODS

The research method used in this research is qualitative. This qualitative research is

to analyse students problem-solving ability viewed from *Adversity Quotient* with three levels; they are High (*Climber*), Middle (*Camper*), and Low (*Quitter*).

This research is performed in SMPN 1 Sumber Cirebon Regency. In this research, the population used is all eight grade students of SMPN 1 Sumber school year 2017/2018. The sample used in this research are eighth-grade students in class VIII K. the sampling method used is *Cluster Random Sampling*. And the teaching material used in this research is a linear equation with two variables.

The data source in this research is the answer sheet of students problem-solving ability test in SPLDV material and ARP questionnaire (*Adversity Response Profile*) as presented in table 1.

Table 1. Data and Research Data Source

Data	Data source	Instrument
Adversity quotient	Student	Questionnaire sheet
Problem-solving ability	Student	Students mathematics problem-solving the test

Data gathering method used in this research is documentation, scale, questionnaire, students problem-solving ability test, and observation. Documentation method is to know important data and document in the form of learning activity photos and students mathematics problem-solving ability test and other things correlated with this research. Those document will be analyzed by the researchers, and presented descriptively.

Scale method is used to measure students AQ level by using *ARP (Adversity Response Profile)*. *ARP* is AQ measuring tool made by Paul G. Stoltz, and its reliability and validity had been tested. This method is used to know the AQ score that students AQ level can be known. Questionnaire method is used to gather data correlated with the mind, feeling, attitude, trust, and respondent personality.

The analysis result of problem-solving in this research consists of an analysis of *quitter*, *camper*, *climber* subjects problem-solving ability. Research subjects work on ten questions of problem-solving ability test. The question used for qualitative material analysis in this research is question number 1. This is because each question has covered all indicators of problem-solving that using one question is enough while the chosen question is question number one.

Research subjects chosen are two students of *quitter* level; they are A17 and A20 subjects. Then, two students of *camper* level, they are A5 and A9 subjects. For the highest level are *climber* students, they are A1 and A2

subjects. For this number one question, six students as the research subjects are interviewed deeply to gather information about problem understanding, planning, performing, and reviewing their answer.

Data analysis technique used consists of three steps; they are data reduction, data presentation, and concluding.

RESULTS AND DISCUSSION

Based on the research result, it is known that all subjects chosen had shown a different result. The research result is as follows:

Quitter students

Quitter students have not been able to solve the problem on all stages of Polya problem-solving. This is seen from the difficulty that the *quitter* students face in solving the problem. *Quitter* students find difficulty in the understanding problem, planning problem solving, performing problem-solving, and they do not review their answer.

Quitter students have not been able to simplify the problem by writing information from what they understand it. It is seen from A17 and A20 subjects answer for question number 1. Their work looks not function to make data example and to determine a suitable strategy to solve the problem as presented in figure 1 and figure 2.

After confirmed during the interview, subject A17 and A20 only know the problem content without knowing the concept and rely on technique from the given an example learned before. Through the interview, *quitter* students still look confused in explaining SPLDV concept applied on sea products in Cirebon. This is seen from A17 and A20 work on question number 1. This is because *quitter* students do not understand the concept and tend to memorize only, that the *quieter* students are confused when they forget the technique they had learned from the example. So it can be concluded that *quitter* students do not understand the problem, do not plan for problem-solving, do not perform problem-solving and do not review their work.

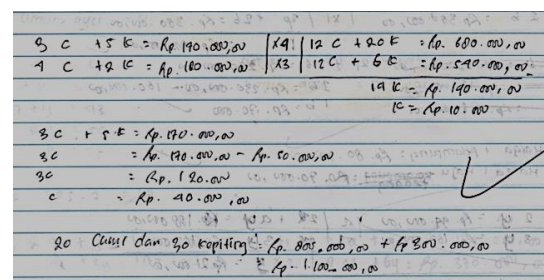


Figure 1. Understanding and Planning Problem Solving Stage, Subject A17 on Question Number 1

Figure 2. Understanding and Planning Problem Solving Stage, Subject A20 on Question Number 1

Camper students

Camper students can identify what is known and asked, make a plan for problem-solving, perform problem-solving, and also review their answer to the questions given. Along with this, camper students are declared as able to reach all indicators of Polya problem-solving ability, as presented in figure 3 and figure 4.

Camper students can simplify the problem by performing experiment and simulation by drawing a picture to help them in making a strategy to simplify the problem, make data example as what is known so that a suitable formula to solve the problem can be determined. This is strengthened with the interview result with A5 and A9 which shows that A5 and A9 can explain how to plan a right and good problem-solving. And it can be concluded that camper students can plan problem-solving well.

The stage of performing plan is done by camper students well. Camper students can substitute data into formula determined and can perform problem-solving in good order and rightly. It is seen from the written result of camper students who can solve the problem rightly.

Figure 3. Understanding Problem Stage, Subject A5 Question Number 1

Camper students can perform the review stage for their answer well. Camper students

review their work by recounting their answer. This is seen from A5 and A9 work on Question number 2. After confirmed through interview it can be concluded that camper students review by recounting because A5 and A9 said that they could not find another way to review their answer. Camper students conclude their answer by using a method that had been planned. Though A5 does not conclude his/her answer on his/her written result he/she can conclude his/her answer during the interview. Answer conclusion is one important indicator to emphasize the right final answer after review.

Figure 4. Understanding Problem, Subject A9 Question Number 1

Climber students

Climber students understand the problem by writing what is known and asked. Climber students plan problem-solving by determining steps and method to solve the problem. They also perform problem-solving by using steps and methods planned before. They also review their answer, as presented in figure 5 and figure 6.

Figure 5. Understanding Problem-Solving Subject A1 Question Number 1

Based on the data analysis, climber students perform problem understanding process and can present it in written form using mathematics language, as what is known and asked. They can identify what is known and asked

Table 2. Comparison among *quitter*, *camper* and *climber* students in Problem Solving

Polya stages	Adversity quotient (QA) categories		
	Quitter	Camper	Climber
Understanding the problem	Quitter students have a little difficulty in understanding problem	Camper students can understand the problem well	Climber students can understand the problem well
Designing a Problem Solving Plan	Quitter students have difficulty in designing a problem solving plan	Camper students can design problem-solving plan well	Climber students can design problem-solving plan well
Performing problem-solving plan	Quitter students have difficulty in performing problem-solving plan	Camper students can perform problem-solving plan well	Climber students can perform problem-solving plan well
Review the problem solving	Quitter students do not review their answer	Camper students do not review their answer	Climber students review their answer

in the problem fluently and rightly and they can mention the problem with their sentence. *Climber* students directly integrate new information they get into knowledge in their mind, and this is by what Piaget said.

Figure 6. Understanding Problem Solving Subject A2 Question Number 1

Climber students can plan problem-solving well. They can simplify the problem by writing the SPLDV mathematics model. This is a strategy to solve the problem to make it simpler. *Climber* students make data example as what is known and asked clearly that they can determine a suitable technique to solve the problem well. *Climber* students perform the plan performing stage well and rightly. *Climber* students can distribute data into formula determined and perform problem-solving in good order and rightly.

Climber students can perform the review stage well. *Climber* students review their work by using another way; it is by redistributing the result they get to check the known data. This means that *climber* students can review their result and process that they are sure with their answer. This is strengthened by concluding. Different from *camper* students, *climber* students solve the problem completely with Polya stages. A1 and A2 can write on their written result, review rightly and conclude the answer to strengthen their final answer.

Based on students written document, it is seen that *climber* students try to do the test

rightly, in good order, and complete that they get an average score of 91. Based on the fact, it shows that *climber* students always try to solve the problem to get the best result. This is by Stoltz theory (2000) who said that individual of *climber* type always try to reach his/her success, ready to face a problem, and always spirited in reaching his/her objective. *Climber* students can mention problem-solving steps well. All indicators of Polya problem solving can be reached by *climber* students as presented in table 2.

CONCLUSION

Based on the research and discussion explained above, we can conclude that *quitter* students group has not been able to perform all problem-solving steps, including understanding the problem, planning a problem solving, performing the problem solving, and reviewing the answer. *Camper* students group can perform 75% of the problem-solving steps, and they understand the problem, planning a problem solving, performing the problem solving, but not in reviewing the answer. *Climber* students groups can perform 100% of the problem-solving steps; they understand the problem, planning a problem solving, performing the problem solving, and reviewing the answer.

ACKNOWLEDGMENT

The researchers thank all parties who had given their help for the success of this research. The headmaster of SMPN 1 Sumber and Mrs. Hj. Yulianingsih, M.Pd., as Mathematics teacher in SMPN 1 Sumber who had facilitated researchers that this research can be realized.

REFERENCES

- Awaliyah, F., Soedjoko, E., & Isnarto. (2017). Analisis kemampuan pemecahan masa-lah dalam pembelajaran model auditory intellectually repetition. *Unnes Journal of Mathematics Education*, 5(3), 243-249.

- Darojat, L., & Kartono. (2016). Kemampuan pemecahan masalah siswa dalam menyelesaikan soal open ended berdasarkan aq dengan learning cycle 7e. *Unnes Journal of Mathematics Education Research*, 5(1), 1-8.
- Hafid, H., Kartono, & Suhito. (2016). Remedial teaching untuk mengatasi kesulitan belajar siswa pada kemampuan pemecahan masalah matematika berdasarkan prosedur newman. *Unnes Journal of Mathematics Education*, 5(3), 257-265.
- Manah, N. K. (2016). Analisis kemampuan pemecahan masalah matematika siswa berdasarkan tahapan polya pada model pembelajaran selective problem solving materi segiempat. *Undergraduates Thesis*. Semarang: Universitas Negeri Semarang.
- Mena, A. B., Lukito, A., & Siswono, T. Y. E. (2016). Literasi matematis siswa smp dalam menyelesaikan masalah kontekstual ditinjau dari adversity quotient (aq). *Jurnal Matematika Kreatif-Inovatif*, 7(2), 187-198.
- Misu, L. (2014). Mathematical problem solving of student by approach behavior learning theory. *International Journal of Education and Research*, 2(10), 181-189.
- Nurhayati, & Fajrianti, N. (2013). Pengaruh adversity quotient (aq) dan motivasi berprestasi terhadap prestasi belajar matematika. *Formatif: Jurnal Ilmiah Pendidikan MIPA*, 3(1), 72-77.
- Rukmana, I., Hasbi, M., & Paloloang, B. (2016). Hubungan adversity quotient dengan hasil belajar matematika siswa kelas xi sma negeri model terpadu madani palu. *Jurnal Elektronik Pendidikan Matematika Tadulako*, 3(1), 326-333.
- Sari, I. K. (2016). Profil pemecahan masalah matematis siswa usia 14-15 tahun di banda aceh. *Numeracy Journal*, 3(1), 77-86
- Utami, S., Nashori, F., & Rachmawati, M. A. (2014). Pengaruh pelatihan adversity quotient untuk meningkatkan motivasi belajar siswa sekolah menengah pertama. *Jurnal Intervensi Psikologi*, 6(1).
- Stoltz, P. G. (2005). *Adversity quotient- mengubah hambatan menjadi peluang*. Translate by Hermaya. Jakarta: Grasindo.
- Wardiana, I. P. A., Wiarta, I. W., & Zulaikha, S. (2014). Hubungan antara adversity quotient (aq) dan minat belajar dengan prestasi belajar matematika pada siswa kelas v sd di kelurahan pedungan. *MIMBAR PGSD Undiksha*, 2(1), 1-11.