

# Students' Difficulties in Solving Mathematical Problem Viewed by Adversity Quotient

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## Abstract

This study aims to determine the difficulties of climbers, campers, and quitters students in solving mathematical problem. This research is a qualitative research with a phenomenological design. The subjects in this study were students of grade VII, a junior high school in Wajo, South Sulawesi. Data collection techniques used were a questionnaire, test, and interview. The results show that the climbers subject face one difficulty in solving a mathematical problem that is difficulty in understanding the problem. The campers subject face three difficulties in solving a mathematical problem that is difficulty in understanding the problem, difficulty in carrying out the plan, and difficulty in looking back. The quitters subject face four difficulties in solving a mathematical problem that is difficulty in understanding the problem, difficulty in devising a plan, difficulty in carrying out the plan, and difficulty in looking back.

**Keywords:** difficulties, solving mathematical problem, adversity quotient.

## 1. INTRODUCTION

Problem solving is one of the important aspects of mathematics. Problem solving is an attempt to find a way out of a difficulty to achieve a goal that cannot be achieved immediately [1]. Mathematical problems that are included in mathematical problem solving are non-routine problems whose solutions cannot be achieved immediately. Some experts find ways to solve mathematical problems, one of which is Polya. Polya found the steps in solving mathematical problems, namely understanding the problem, devising a plan, carrying out the plan, and looking back [2].

However, in carrying out the steps of solving mathematical problems, many students have difficulties [3]. When students experience difficulties, it will test students' resilience. Whether students will choose to give up or continue to try to solve the given problem. This is where the role of the adversity quotient (AQ) shows the students' ability to deal with the difficulties they are experiencing.

AQ is a person's resilience in the face of obstacles and difficulties [4]. Everyone certainly has a different AQ level. The AQ levels are grouped into 3 categories, namely: climbers, campers, and quitters. Climbers are a group of people who always try to face obstacles to reach the peak of success, or what can be called high AQ. Campers are a group of people who try to face obstacles, but are easily satisfied with what has been achieved, so they do not reach the peak of success, or it can be called moderate AQ. Meanwhile, quitters are a group of people who give up easily in the face of obstacles, or what can be called low AQ. People with the climber type tend to choose to continue to struggle and do not give up easily in facing various problems, so that the results obtained are better than people with the type of campers and quitters. People with the camper type tend to be easily satisfied with what has been achieved, so that the results obtained are not optimal. Meanwhile, people with the quitters type tend not to be enthusiastic to solve a problem and even give up before making an effort, so the results are also nil.

Based on the description above, the focus of this research is to determine the difficulties of climbers, campers, and quitters students in solving mathematical problem. It is important to provide information to teachers about the difficulties of climbers, campers, and quitters students in solving mathematical problems so that it can be considered by teachers in choosing the right learning strategy by involving students' AQ. In addition, it provides information to students about the material that must be improved.

## 2. Methods

This research is a qualitative research with a phenomenological design. The subjects in this study were three students of grade VII, a junior high school in Wajo, South Sulawesi. Selection of subjects based on data obtained from the AQ questionnaire and mathematical problem solving test.

Data collection techniques in this study include questionnaire, test, and an interview. The research instruments used include AQ questionnaire, mathematical problem solving test, and interview guidelines. All research instruments have been validated by experts. Based on the scoring category of the AQ questionnaire according to Stoltz (2000), climbers students had scores between 166 to 200. Campers students had scores between 95 and 134. And quitters students had scores between 0 and 59. The topic in the mathematical problem solving test given was algebra, especially on applying algebra to solve real problems. Furthermore, based on the test results, one student was selected purposively, from each category to be interviewed. Data analysis techniques in this study used the Model of Miles and Huberman [5], namely data reduction, data presentation, and conclusion/verification. The data validity check was done by using credibility test, transferability test, dependability test, and confirmability test.

## 3. Result and Discussion

Based on the results of the AQ questionnaire and mathematical problem solving tests, one student was selected purposively from each category to be interviewed. Details of research subjects are presented in table 1.

Table 1. Research subjects

Student Code	Questionnaire Score	AQ Category	Test Score
S-01	168	Climbers	98
S-02	123	Campers	71
S-03	58	Quitters	8

From table 1, it can be seen that the test score obtained by the climbers subject was better than the campers subject and the test score obtained by the campers subject was better than the quitters subject. This is in line with Stoltz's theory (2000) which states that climbers tend to choose to continue to struggle and do not give up easily in facing various problems, so that the results obtained are better than people with the campers and quitters type. People with the camper type tend to be easily satisfied with what has been achieved, so that the results obtained are not optimal. Meanwhile, people with the quitters type tend not to be enthusiastic to solve a problem and even give up before making an effort, so the results are also nil. The following is a description of students' difficulties in solving mathematical problems of each research subject.

3.1 Description of the difficulty of S-01 (climbers)

<p><b>Jawab:</b></p> <p>a. Dik: Pak Sufyani mempunyai kebun pisang berbentuk persegi dan Pak Tatang mempunyai kebun kelapa berbentuk persegi panjang. Panjang kebun kelapa Pak Tatang 20 m lebih panjang dari sisi kebun pisang Pak Sufyani. Sedangkan lebarnya 15 m kurang dari panjang sisi kebun pisang Pak Sufyani. Kedua luas kebun Pak Sufyani dan Pak Tatang adalah sama.</p> <p>Dit: Tentukan luas sebenarnya kebun pisang Pak Sufyani!</p> <p><b>Jawab:</b></p> <p>c. <math>L = \text{Sisi} \times \text{sisi}</math>  <math>= x \times x</math>  <math>= x^2</math></p> <p><math>L = \text{panjang} \times \text{lebar}</math>  <math>= (x+20) \times (x-15)</math>  <math>= x^2 - 15x + 20x - 300</math>  <math>= x^2 + 5x - 300</math></p> <p><math>x^2 = x^2 + 5x - 300</math>  <math>0 = 5x - 300</math>  <math>300 = 5x</math>  <math>x = 60</math></p> <p><math>L = x^2</math>  <math>= 60^2</math>  <math>= 3600</math></p> <p>b. Cari L <input type="checkbox"/></p> <p>Cari L <input type="checkbox"/></p> <p>dibuat <math>x^2 = x^2 + 5x - 300</math></p> <p>Cari L <input type="checkbox"/> sebenarnya</p> <p>d. <math>x^2 = x^2 + 5x - 300</math>  <math>= 60^2 + 5 \cdot 60 - 300</math>  <math>= 3600 + 300 - 300</math>  <math>= 3600</math></p>	<p><b>Answer:</b></p> <p>a. Known: Mr. Sufyani has a square banana garden and Mr. Tatang has a rectangular coconut garden. The length of Mr. Tatang's coconut garden is 20 m longer than the side of Mr. Sufyani's banana garden. Meanwhile, the width is 15 m less than the length of the side of Mr. Sufyani's banana garden. Two areas of Mr. Sufyani and Mr. Tatang's gardens are the same.</p> <p>Asked: Determine the actual area of Mr. Sufyani's banana garden!</p> <p>c. <i>Area of square = side × side</i>  <math>= x \times x</math>  <math>= x^2</math></p> <p><i>Area of rectangle = length × width</i>  <math>= (x + 20) \times (x - 15)</math>  <math>= x^2 - 15x + 20x - 300</math>  <math>= x^2 + 5x - 300</math></p> <p><math>x^2 = x^2 + 5x - 300</math>  <math>0 = 5x - 300</math>  <math>300 = 5x</math>  <math>x = 60</math></p> <p><i>Actual area of square = <math>x^2</math></i>  <math>= 60^2</math>  <math>= 3600</math></p> <p>b. find the area of the square          find the area of the rectangle          make an equation <math>x^2 = x^2 + 5x - 300</math>          find the actual area of the square</p> <p>d. <math>x^2 = x^2 + 5x - 300</math>  <math>= 60^2 + 5 \cdot 60 - 300</math>  <math>= 3600 + 300 - 300</math>  <math>= 3600</math></p>
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Figure 1. The results of S-01 in the mathematical problem solving test

The climbers subject experienced one difficulty in solving mathematical problems, namely difficulty in understanding the problem. S-01 is able to identify the information that is known and asked for the questions. S-01 is also able to differentiate between square and rectangular concepts. However, S-01 admitted that he had difficulty in understanding the problem, especially in making mathematical models for known problems. For example, the length of Mr. Tatang's coconut garden is 20 m longer than the side of Mr. Sufyani's banana garden, while the width of Mr. Tatang's coconut garden is 15 m less than the length of the side of Mr. Sufyani's banana garden. S-01 was initially confused in understanding the sentence, after a few minutes he was finally able to write it into mathematical model  $x+20$  and  $x-15$ .

3.2 Description of the difficulty of S-02 (campers)

<p>JAWABAN</p> <p>a. <del>Diketahui</del> Diketahui panjang kebun kelapa Pak Tatang 20 m lebih panjang dari sisi kebun pisang Pak Sufyani. Sedangkan lebarnya 15 m kurang dari panjang sisi kebun Pak Sufyani. Luas kebun Pak Sufyani dan Pak Tatang adalah sama.</p> <p>Ditanyakan luas sebenarnya kebun Pak Sufyani.</p> <p>6. <del><math>20+x + 15-x = 300</math></del></p> <p>L. Kebun Pak Tatang = <math>(20+x) \times (15-x)</math></p> $= 300 - 20x + 15x - x^2$ $= 300 - 5x - x^2$ <p>L. Kebun Pak Sufyani = sisi x sisi</p> $= x \times x$ $= x^2$ $x^2 = 300 - 5x - x^2$ $0 = 300 - 5x$ $5x = 300$ $x = \frac{300}{5}$ $x = 60$ <p>L. Kebun Pak Sufyani = <math>x^2</math></p> $= 60^2$ $= 3600$	<p>Answer:</p> <p>a. It is known that the length of Mr. Tatang's coconut garden is 20 m longer than the side of Mr. Sufyani's banana garden. Meanwhile, the width is 15 m less than the length of the side of Mr. Sufyani's banana garden. Two areas of Mr. Sufyani and Mr. Tatang's gardens are the same.</p> <p>c. Asked the actual area of Mr. Sufyani's garden</p> <p>Area of rectangle = length <math>\times</math> width</p> $= (20 + x) \times (15 - x)$ $= 300 - 20x + 15x - x^2$ $= 300 - 5x - x^2$ <p>Area of square = side <math>\times</math> side</p> $= x \times x$ $= x^2$ $x^2 = 300 - 5x - x^2$ $0 = 300 - 5x$ $5x = 300$ $x = 60$ <p>Actual area of square = <math>x^2</math></p> $= 60^2$ $= 3600$
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Figure 2. The results of S-02 in the mathematical problem solving test

The campers subject experienced three difficulties in solving mathematical problems, namely difficulty in understanding the problem, difficulty in carrying out the plan, and difficulty in looking back. The first, the difficulty in understanding the problem, S-02 is able to identify the information that is known and asked for the questions, even though it is still incomplete. S-02 is also able to differentiate between square and rectangular concepts. However, S-02 made a mistake in making a mathematical model of the sentence, the width of Mr. Tatang's coconut garden is 15 m less than the length of the side of Mr. Sufyani's banana garden. S-02 is wrong by writing 15-x, when it should be x-15. The second is the difficulty in carrying out the plan, S-02 was wrong in solving an equation. S-02 performed the method of moving segments according to what her teacher taught her, but she forgot to change the sign so that the results obtained were also wrong. The third is the difficulty in looking back, S-02 is confused about how to look back. S-02 was quickly satisfied with what was obtained.

### 3.3 Description of the difficulty of S-03 (quitters)

<p>jawab:</p> <p>a. Diketahui: panjang kebun kelapa Pak Tatang 20 m lebar 15 m</p> <p>Ditanyakan: Luas kebun Pak Sufyani</p> <p>b. <math>L = p \times l</math></p> <p><math>= 20 \times 15</math></p> <p><math>= 300</math></p>	<p>Answer:</p> <p>a. Known: The length of Mr. Tatang's coconut garden is 20 m and the width is 15 m</p> <p>Asked: Area of Mr. Sufyani's banana garden</p> <p>b. <i>Area of rectangle = length <math>\times</math> width</i></p> <p><math>= 20 \times 15</math></p> <p><math>= 300</math></p>
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Figure 3. The results of S-03 in the mathematical problem solving test

The quitters subject experienced four difficulties in solving mathematical problems, namely difficulty in understanding the problem, difficulty in devising a plan, difficulty in implementing the plan, and difficulty in looking back. The first, the difficulty in understanding the problem, S-03 was unable to identify what information was known from the questions. For example, the length of Mr. Tatang's coconut garden is 20 m more than the side length of Mr. Sufyani's banana garden, S-03 is unable to write it into a mathematical model,  $x + 20$ . S-03 looks confused to determine what is being asked for the questions. The S-03 also doesn't really understand the concept of square and rectangle. The second is the difficulty in devising a plan, S-03 cannot determine the initial idea, cannot determine the formula / theorem to be used, and does not know how to connect the concepts so confused in determining steps for completion. The third is the difficulty in carrying out the plan, S-03 does not know how to operate multiplication in algebraic forms, for example, in the form  $(x + a) \times (x + b)$ . In addition, S-03 also doesn't know how to solve an equation. S-03 made several mistakes in basic calculations, including  $x \times x = 2x$  when it should be  $x^2$ . The fourth is the difficulty in looking back, S-03 does not know how to look back.

## 4. Conclusion

The climbers subject experienced one difficulty in solving mathematical problems, namely difficulty in understanding the problem. The subject has a little difficulty in understanding the problem, especially in making a mathematical model of the known problem. The campers subject experienced three difficulties in solving mathematical problems, namely difficulty in understanding the problem, difficulty in carrying out the plan, and difficulty in looking back. The difficulty in understanding the problems experienced is not being able to properly identify what information is known about the problem so that it is wrong to make mathematical models. The difficulty in carrying out the plan is making mistakes in solving an equation. The difficulty in looking back is being confused about how to do looking back. The quitters subject experienced four difficulties in solving mathematical problems, namely difficulty in understanding the problem, difficulty in devising a plan, difficulty in implementing the plan, and difficulty in looking back. The difficulty in understanding the problem experienced is not being able to identify what information is known and asked so that they cannot make mathematical models and do not understand the concepts/definitions related to the problem. The difficulty in devising a plan experienced is cannot determine the initial idea, cannot determine the formula / theorem to be used, and do not know how to connect the concepts so they are confused in determining the steps for completion. The difficulty in carrying out the plan experienced is that they cannot operate the multiplication in algebraic form and cannot solve an equation. The difficulty in looking back experienced is not knowing how to look back.

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