



The role of resilience (adversity intelligence) and creativity in mathematics learning

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Abstract

This study aims to analyze and prove the existence of resilience influence and creativity to the ability of problem solving in mathematics. The method of study used is survey method with correlational analysis. The population of this study is all students of class X SMK Kharismawita 2, South Jakarta. While the sample is 30 students class X SMK Kharismawita 2, South Jakarta in the academic year 2017/2018. Further, the instruments of data collection consisted of: a questionnaire about resilience and creativity, and a written test of mathematics subjects. The requirements of data analysis consist of: normality, linearity, and multi-collinearity test. The result of three data analysis requirement test obtained by conclusion that the three groups of data come from normal distributed population, the two regression models which are formed are in linear pattern, and there is no relation between the independent variables. Further the hypothesis test is done by correlation and regression test. Eventually, from the results of hypothesis test and analysis, it can be concluded that there is influence of resilience and creativity to the problem solving ability in mathematics. It means that resilience variable and creativity play a role in mathematics learning, which affect the problem solving skills of mathematics. Thus, in the learning, teachers focused on the factors of resilience and creativity of learners and made efforts to improve both of these factors through interesting math learning.

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1. Introduction

Mathematics is one of the subjects given in formal education which one of them is at the level of education namely Vocational High School. This is in accordance with Law No. 20 of 2003 concerning about National Education System (Sisdiknas) article 37, namely "the curriculum of elementary and senior education must contains: a) religious education, civic education, c) language, d) mathematics, e) nature, f) social science, g) art and culture, h) physical and sport education, i) skill/ vocational and also j) local content."

In addition, in the Regulation of the Minister of National Education (Permendiknas) number 22 of 2006 on Mathematics Subject Content Standard explains that "Mathematics in Vocational High School (SMK) aims that students SMK are able to: 1) understand the concept of mathematics, explain the interconnection between concepts, and apply

concepts and algorithms. automatically, appropriately, efficiently, and appropriately in the problem, 2) use falsification of patterns and characteristics, perform mathematical manipulations in generalizing, collect the evidences, or explain mathematics ideas and statements, 3) Solve the problems including understanding the problem, designing mathematical model, completing the model, and also interpreting solutions, 4) communicate ideas with symbols, tables, diagrams, or other media to clarify circumstances or problems, 5) have an appreciative attitude to the use of mathematics in real life, that is having curiosity, attention in mathematics learning, and a tenacious attitude and confidence in problem solving.

Besides, one of the aims of mathematics learning at SMK is based on Permendiknas number 22 of 2006 is to solve the problems that include understanding the problem, designing mathematics model, completing the model, and

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interpreting solution produced. Thus, the ability in problem solving in mathematics is highly important. It is supported that mathematics is a lesson which trains students to think and solve the problems. Students need mathematics to fulfil their practical needs and solve problems in daily life, for instance, being able to count, calculate the content and weight, collect, process, present and interpret the data, use the calculator and computer (Ekawati, 2011).

Although mathematics has important roles and benefits both in learning and in daily life, but the ability of the learning activities of mathematics is still not maximal. One of the indicators is from PISA results in 2012 and 2015 as shown in the following table.

Table 1. Summary of PISA Results 2012 and 2015

Year	Dat abas e	Viet nam	Tha ilan d	Ind ones ia	Bra sil	Per u
2012	Medi an	531	441	327	399	372
	Aver age	528	444	382	402	373
2015	Medi an	522	416	359	394	392
	Aver age	525	421	403	401	395
Increa se	Medi an	-9	-25	32	-5	20
	Aver age	-3	-23	21	-1	22

(Source: Kemdikbud, 2015)

Based on table 1, the average or median of PISA Indonesia is still below Vietnam and Thailand. Yet, there is something to be proud of that is an increase in both the average and the median from 2012 to 2015. So, it improves the provisions of mathematics learning to be better.

Furthermore, the problems of mathematics learning achievement, especially mathematics problem solving ability, also occur in SMK Kharismawita 2, South Jakarta. KKM for math subject is settled 75. While the mathematics learning result is still under KKM value. In addition, based on the results of the national examination scores of the last three years (2015 – 2017), there is a decrease in average value, as in the following table.

Table 2. Summary of National Examination Results SMK Kharismawita 2 South Jakarta

Year	2017	2016	2015
Average	49,17	58,67	64,03

(Source: Balitbang Kemdikbud, 2017)

Based on the Table 2, it is necessary to find solutions or solutions in order mathematics learning is able to produce maximum results. There are several factors that influence the achievement of mathematics learning, one of the factors which comes within the learners are resilience (adversity intelligence) and creativity. According to Supardi U.S. (2014: 634), resilience is an attitude of a person to be able to recognize a problem and its causes, to deal with problems well, and to solve problems well too. In addition, it is an assessment that measures how one's response in understanding him/herself in improving the success from all aspects of life (Ahmad, 2013: 82).

Besides, creativity factors are also able to influence mathematics learning achievement, especially the ability to solve mathematical problems. According to Eddy (2006: 104), creativity is a person's ability to create something new, either in the form of ideas and real work or new works and combinations with old things, which have never existed before. Meanwhile, creativity ability consists of several aspects or dimensions. Based on the results of the study, there are several instruments of creativity measurements which are developed. It consists of 3 dimensions or sub-variables, namely: (1) dynamic; (2) innovative; (3) flexible and open (Supardi et al. 2014: 295).

Based on the description of the above problems, it is interested to conduct study related to above mentioned explanation, entitled *Roles of Resilience (Intelligence Intelligence) and Creativity in Mathematics Learning*. The problem that will be discussed in this study is "is there any influence of resilience (adversity intelligence) and creativity to solving mathematics problem".

2. Method

This study was conducted at SMK Kharismawita 2, Jagakarsa, South Jakarta. The method used is survey method with correlational analysis. The research design is as pictured in following figure.

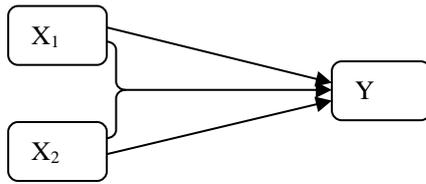


Figure 1. Research Design

- X1 = resilience (adversity intelligence)
- X2 = creativity
- Y = mathematics problem solving

The population in this study was all students of class X SMK Kharismawita 2, South Jakarta. While the sample of students class X SMK Kharismawita 2 academic year 2017/2018 was 30 students. The research instruments consisted of: a questionnaire of lethargy and creativity, and a written test of multiple-choice forms of mathematical problem-solving abilities.

3. Results & Discussion

3.1. Findings

The data obtained by the researchers, then processed and analyzed through the SPSS program. Before testing the hypothesis, firstly the requirements of data analysis which consists of normality test, linearity test, and multicollinearity test was done. Testing requirements data analysis was done with SPSS program. Meanwhile the normality test was done to know whether data is a normal distribution or not. Then, the results of normality test data can be seen through the following table.

Table 3. Summary of Normality Test Results

Variable	KS-Z	Sig.	Conclusion
X ₁	0,673	0,756	Normally distributed data
X ₂	0,428	0,993	Normally distributed data
Y	1,173	0,123	Normally distributed data

Based on Table 2, all the Sig values are > 0.05 which means that the data of the three variables are normally distributed or the data comes from a normal distributed population. After the normality test, then the data processed through the linearity test. Linearity test is done to find out whether the model or equation of regression line are linear

patterned or not. The results of this test can be seen in the following table.

Table 4. Summary of Linearity Test Results

Lines Tested	F	Sig.	Conclusion
Y over X ₁	1,246	0,392	Regression line is linear patterned
Y over X ₂	0,698	0,755	Regression line is linear patterned

Based on Table 3, all the Sig values are > 0.05 which means that the two regression lines formed are linear pattern. Then the next requirements of data analysis is a multicollinearity test. This test is done in order to know whether there is a relationship between independent variables (resilience and creativity) or not. Based on the results of multicollinearity test, it is obtained that tolerance value = 0,643 (Tolerance value is > 0, 10) and VIF value = 1,556 (VIF value is < 10, 00). It means that there is no multicollinearity or no relationship between independent variables. As for the three testing requirements data analysis are done, the hypothesis test can be done. Meanwhile, the results of the hypothesis test can be seen in the following table.

Table 5. Summary of Results of Correlation Test

Summary Mode. ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.139 ^a	.019	-.053	11.35085

a. Predictors: (Constant), creativity, resilience

b. Dependent Variable: understanding the concept of mathematics

Based on Table 4, form double correlation test results, it is obtained that R value = 0.139 or double correlation coefficient of 0.139. It means that the ability to solve mathematical problems is influenced by factors of resilience and creativity of 1.9% (R Square = 0.019) and other factors of 98.1%. In brief, there is a positive relationship between resilience and creativity to math problems solving. Indeed, it includes a weak correlation categories. Then the results of regression tests can be seen through the following table.

Table 6. Regression Equations

Model	Unstandardized Coefficients		Standardized Coefficients		t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta				Tolerance	VIF
1 (Constant)	72.746	23.668			3.074	.005		
Resilience	.200	.294	.162		.681	.502	.643	1.556
Creativity	-.171	.277	-.147		-.619	.541	.643	1.556

a. Dependent Variable: understanding the concept of mathematics

Based on Table 5, it is obtained that the value of constant (a) = 72.746 and the resilience (B1) = 0,200 and creativity (B2) = -0.171. Hence, the model or regression equation which is formed is $Y = 72,746 + 0,200 X_1 + (-0,171) X_2$.

Table 7. Summary of Regression Test Results

ANOVA ^b						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	68.735	2	34.368	.267	.768 ^a
	Residual	3478.731	27	128.842		
	Total	3547.467	29			

a. Predictors: (Constant), creativity, resilience

b. Dependent Variable: understanding the concept of mathematics

Based on Table 6, the results of multiple regression are the value of F = 0.264 and Sig value. = 0.768 or Sig value. > 0.05. It means that there is no significant effect of resilience and creativity in solving mathematical problems.

3.2. Discussion

Mathematical problem solving is one of the abilities in mathematics learning achievement. This ability shows that the students are able to find the right solution of a problem encountered. This study analyzes the factors that affect the ability of mathematical problems solving, namely resilience (adversity intelligence) and creativity. Based on the results of hypothesis test, it is obtained that R value= 0.139 which means that there is a positive relationship between resilience (adversity intelligence) and creativity to mathematics problems solving. The relationship is quite weak, it is seen from the value of R Square = 0.019 or 1.9%. It means that the contribution of resilience and creativity variables to mathematics problem

solving is 1.9% and the rest of 98.9% is by other factors.

However, resilience (adversity intelligence) is an important factor in the ability to solve mathematical problems. A person who has good grades of resilience, will be able to assess a problem as an opportunity and a challenge not as a hindrance. Again, resilience is an assessment that measures how a person's response in facing problems and challenges to be empowered into opportunities (Slotz, 2000: 51). In addition, according to Ahmad (2016: 56), resilience has the following elements: 1) the ability to control feelings; 2) skillfully solving problems that are limited by time and place which will be passed quickly and effectively; 3) developin the resilience and tenacity in facing the problems; 4) not easily discouraged in facing problems and challenges in life.

Besides, creativity is also one of the factors that support the ability to solve mathematical problems. Through creativity, a person is able to create new ideas or in finding solutions of a problem. Utami (2004: 25) states that creativity is essentially a general ability to create something new, as the ability to give new ideas that can be applied in problem solving, or to see new relationships between elements that have been there before.

Based on result of hypothesis test that is multiple regression test, it is obtained that regression model $Y = 72,746 + 0,200 X_1 + (-0,171) X_2$ and also based on regression significant test F value = 0,264 and value of Sig. = 0.768 or Sig value. > 0.05. It means that there is no significant effect of resilience and creativity on mathematics problems solving. Meanwhile, according to Sambada (2012: 47), there is a positive influence between students' creativity on the ability of physics problem solving. The level of student creativity provides a real role in problem-solving skills in physics learning. In addition, according to Sugesti, et al. (2014: 8-9), students with high Adversity Quotient have better mathematics learning achievement than with moderate and low Adversity Quotient ones. Students with Adversity Quotient are having better mathematics learning achievement than low Adversity Quotient students.

With regard to above explanation, basically there is influence resilience (adversity intelligence) and creativity to mathematics problem solving. Indeed, it is necessary to develop the resilience and creativity possessed by students whom firstly

observed and analyzed their ability resilience and creativity at the beginning of mathematics learning. One of the efforts to improve creativity is through problem-solving learning. To improve the activities and creativities of mathematics students learning in elementary school is required a problem-solving learning. Due to the problem-solving learning, students' learning activities and of student can be seen from the learning process which indeed requires them to be actively involved in it and think creatively in solving existing problems (Sulianto and Mandarsary, 2011). "

4. Conclusions

Based on the results of hypothesis test and data analysis, it can be concluded that there is a non-significant influence of resilience (adversity intelligence) and creativity to mathematics problems solving. It is indicated through the value of $F = 0.264$ and the value of $Sig. = 0.768$ or Sig value. > 0.05 . In addition, the relationship that occurs between resilience (adversity intelligence) and creativity with mathematics problem solving is classified as weak one.

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