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The Effect of Creative Thingking Ability and Basic Mathematics Ability Toward Students Problem Solving

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Abstract

This research is an ex post facto research with a quantitative approach. The population in this study were all class VIII of SMP Negeri 2 Ladongi with a total of 73 students. Using total sampling technique so that a total sample of 73 students is obtained. Data collection techniques using tests. Data analysis using multiple regression analysis. The conclusions in this study are as follows: (1) Decryptively, students' mathematics creative thinking abilities are in the quite creative category, students' basic mathematics abilities are in the medium category, students' mathematics problem solving abilities are in the low category; (2) there is a significance influence of students' mathematics creative thinking skills on mathematics problem solving abilities with $t_{hitung} > t_{tabel}$ 8,81 >1,666 and sig < α atau 0,001 < 0,05; (3) There is a significance positive effect on basic mathematics ability on mathematics problem solving ability with $t_{hitung} > t_{tabel}$ or 3,10 > 1,666 and sig < α atau 0,004 < 0,05; (4) There is a significance positive influence on mathematics creative thinking skills and basic mathematics abilities on the mathematics problem solving abilities of class VIII students of SMP Negeri 2 Ladongi with $F_{Hitung} = 65,71$ or $F_{Tabel} = 3,13$ or $F_{Hitung} \geq F_{Tabel}$ and significance = 0.000 < α = 0.05.

Keywords: *Creative Thinking Abilities, Basic Mathematics Abilities, Problem Solving Abilities.*

A. Introduction

During the pandemic all educational activities starting from the elementary, secondary and even tertiary levels were carried out online, without face-to-face meetings between teachers and students. Online learning is a learning that implementation utilizes internet connection in communication between teachers and students. Because learning is carried out online, of course there are many obstacles to be faced, one of which is the lack of supervision from educators to students so that one way is to give assignments at each meeting to develop student knowledge about the material that has been or will be studied (Andri et al., 2022; Rangkuti & Sukmawarti, 2022). This will certainly encourage students to think creatively in order to complete their assignments. Creative thinking, namely the ability to provide various possible answers or problem solving based on the information

provided and spark many ideas for a problem. This understanding focuses on many ways of solving a problem and bringing up new ideas about a problem (Jayanto & Noer, 2017). In the process of solving problems it takes students' ability to think creatively. The ability to think creatively is a person's ability to give birth to something new, both in the form of ideas and concrete works that are relatively different from those that existed before (Rahman, 2012).

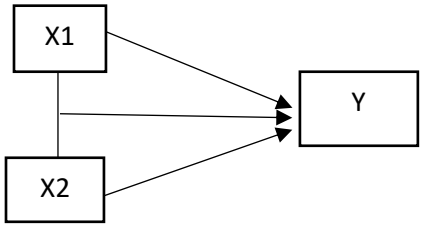
In Solving mathematics problems also requires mastery of the initial concepts that students must know in order to be able to relate to new concepts, because mathematics is an order of organized structure, mathematical concepts are arranged hierarchically and systematically, starting from the simplest concepts to the most complex ones. the most complex concept (Hutagalung, 2017; Sari et al., 2022) . This shows the importance of understanding basic concepts, so special attention is needed for the ability to understand basic mathematical concepts. Lack of mastery of basic knowledge of mathematics will affect students' problem-solving abilities (Ardani & Yulianti, 2022).

Problem solving is also one of the goals of learning mathematics in which there are four aspects of problem-solving skill as follows: (1) understanding the problem, in the aspect of understanding the problem involves deepening the problem situation, sorting out facts, determining relationships between facts and making formulations problem question. Every written problem, even the easiest one, must be read repeatedly and the information contained in the problem is studied carefully, (2) make a problem solving plan, a solution plan is built taking into account the structure of the problem and the questions to be answered. In the process of learning problem solving, students are conditioned to have experience implementing various kinds of problem solving strategies, (3) carrying out problem solving plans. To find the right solution, the plans that have been made must be implemented carefully. Diagrams, tables or sequences are carefully constructed so that the problem solver is not confused. If inconsistencies appear when carrying out the plan, the process must be reviewed to find the source of the difficulty of the problem, (4) look (check) again, while checking, problem solutions must be considered, Polya (Amir, 2015).

In this research, it will be discussed about: 1). Description of students' mathematics creative abilities, basic mathematics ability, and students' mathematics problem solving ability. 2). The simultaneous effect of students' mathematics creative abilities and basic mathematics abilities on students' mathematical problem solving ability. 3). Partial effect of students' mathematical creative abilities on students' mathematics problem solving abilities. 4). Partial effect of students' basic mathematical abilities on students' mathematical problem solving abilitiy.

B. RESEARCH METHODS

The research method used is a quantitative method. This type of research is Ex-post facto research. In this study, there was no treatment or manipulation of the research variables, but rather revealed facts based on measuring the variables that were already existed in the respondents and to find out the causal relationship between the research variables. There are two types of variables used in this study, namely the independent variable (X) and the dependent variable (Y). the independent variables in this study were Students' Mathematical Creative Ability (X1) and Basic Mathematical Ability (X2), while the dependent variable was Mathematical problem solving ability (Y). The research design is as follows:



(Sugiyono, 2013)

Figure 1. Research Design

This research was conducted at SMP Negeri 2 Ladongi in the 2021/2022 Academic Year. The population in this study were all Class VIII students of SMP Negeri 2 Ladongi, totaling 73 students. The sampling technique used is the total sampling technique or saturated sample because the population is not sufficient for 100 respondents. Total sampling is using the entire population as a sample in research (Sundayana, 2020). So that all students of class VIII SMP Negeri 2 Ladongi were included in the research data collection.

The instruments used in this study were the Mathematical Creative Thinking Ability Test, the Basic Mathematical Ability Test, and the problem solving Ability Test. The creative thinking ability test is structured in the form of a description or essay of 3 valid questions, which are measured through 4 indicators, namely: fluency, flexibility, originality, and elaboration. The score given is adjusted to the guidelines for scoring creative thinking skills developed by Bosch. The basic math ability test is structured in the form of multiple choice questions with four alternative answers of 25 valid questions, which are measured using indicators of addition, subtraction, multiplication and division of a number. the score for each answer on the basic math ability test is that correct is given a score of 1 and wrong is given a score of 0. Furthermore, for the problem solving ability test it is arranged in the form of description questions or essays which are developed in the form of story questions as many as 6 valid questions, which measured using indicators: understanding the problem, planning a solution, carrying out the solution, and checking again. The scores given are adjusted to the guidelines for scoring problem-solving skills developed by Polya.

The research data obtained were then analyzed using descriptive statistics and inferential statistics. Descriptive statistics are used to describe categories of students' ability to think creatively, basic mathematical abilities and mathematical problem solving abilities. Furthermore, the inferential statistics performed were multiple linear regression tests using IBM SPSS 20.

C. RESEARCH RESULTS AND DISCUSSION

After conducting descriptive statistical tests, a description of Students' Mathematical Creative Thinking Ability, Students' Basic Mathematics Ability, and Students' Mathematics Problem Solving Ability, which will be presented in the following table:

Table 1: Data Description of students Mathematical Creative Thingking Ability

Category	Interval	Frequency	Percentage
Very Creative	81 ≤ PK	3	4,11%
Creative	61 ≤ PK < 81	32	43,84%
Creative Enough	41 ≤ PK < 61	16	21,92%
Less Creative	21 ≤ PK < 41	10	13,70%
Nor Creative	PK < 21	12	16,43%
Total		73	100%
Average		54,19	

Based on table 1, the ability to think creatively mathematically for students who are in the Creative category is the highest, namely as many as 32 people or 43.84%, but overall out of 73 students the average ability to think creatively mathematically for students of SMP Negeri 2 Ladongi class VIII are in the quite creative category with an average value of 54.19.

Table 2. Data Deskription of Students Basic Mathematics Ability

Kategori	Interval	Frekuensi	Persentase
Very High	78 ≤ KD	3	4.10%
High	62 ≤ KD < 78	23	31,51%
Medium	46 ≤ KD < 62	27	36,99%
Low	30 ≤ KD < 46	15	20,55%
Very Low	KD < 30	5	6,85%
Total		**73**	**100%**
Average		54,34	

Based on table 2, the students' basic mathematical ability in the medium category is the highest, namely 27 people or 36.99%. The average value of the basic ability of mathematics of 73 students is 54.34. This shows that basic ability Mathematics of SMP Negeri 2 Ladongi class VIII is in the medium category.

Table 3. Data Deskription of Students Mathematics Problem Solving Ability

Kategori	Interval	Frekuensi	Persentase
Very High	64,56 ≤ KPM	4	5,50%
High	54 ≤ KPM < 64,56	18	24,70%
Medium	43,7 ≤ KPM < 54	32	43,80%
Low	33,3 ≤ KPM < 43,7	15	20,50%
Very Low	KPM < 33,3	4	5,50%
Total		73	100%
Average		41,92	

Based on table 3, the ability to solve mathematical problems for students who are in the medium category is the highest, namely as many as 32 people or 43.84%, but overall out of 73 students the average mathematical problem solving ability of students of SMP Negeri 2 Ladongi class VIII still in the low category with an average value of 41.92.

Furthermore, inferential statistical tests were carried out to determine the effect of the independent variables on the dependent variable both simultaneously and partially as follows:

1. Simultaneous Test Result (F)

The formulation of the hypothesis tested is as follows:

H_0: $\beta_1 = \beta_2 = 0$ (No effect)

H_1: Not H_0 (There is a joint effect)

With the test criteria, namely:
If $F_{Hitung} < F_{Tabel}$ then H_0 is accepted, If $F_{Hitung} \geq F_{Tabel}$ then H_0 is rejected.

With F table at a significance level α = 0.05 with db1 = 2 and db2 = 73 – 3 = 70 of 3,13.

Table 4. Anova analisys results with SPSS

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18256,566	2	9128,283	65,718	,000[b]
	Residual	9723,074	70	138,901		
	Total	27979,641	72			

a. Dependent Variable: Problem Solving Ability (Y)
b. Predictors: (Constant), Basic Math Ability (X2), Creative Thingking Ability (X1)

Based on table 4, obtained F_{Hitung} = 65,71 dan F_{Tabel} = 3,13 or $F_{Hitung} \geq F_{Tabel}$ and significance= 0.000 < α = 0.05 then H0 is rejected.Thus it can be concluded that there is a significance influence on the ability to think creative mathematics and basic mathematical abilities on the ability to solve mathematical problems in class VIII students of SMP Negeri 2 Ladongi.

To see the magnitude of the value of determination or the simultaneous effect of the variables on the ability to think creatively in mathematics and basic ability in mathematics on the ability to solve mathematical problems is presented in the following table:

Table 5. Model Summary Results with SPSS

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,808[a]	,652	,643	11,78563

a. Predictors: (Constant), Basic Math Ability (X_2), Creative Thingking Ability (X_1)

Based on table 5, the magnitude of the coefficient of determination R square obtained is 0.652. The meaning of these coefficients is that the influence exerted simultaneously by the variables of mathematical creative thinking ability and basic mathematical ability is 65.2% while 34.8% is influenced by other variables not examined in this study.

2. Partial Test Results (T)

Research hypothesis:

$$H_0: \beta_i = 0, \text{i} = 1, 2$$
$$H_1: \beta_i \neq 0, \text{i} = 1, 2$$

With the test criteria,

H_0 is rejected if $|t_{hitung}| \geq t_{tabel}$ or significance value < α at level α = 0,05

H_0 is accepted if $|t_{hitung}| < t_{tabel}$ or significance value > α at level α = 0,05

Tabel 6. Corelation Coeficient Analysis Result For Y and X_1 when X_2 Constant

Correlation coefficient (r)	Coefficient of Determination (KD)	t_{hitung}	Signifikasi	t_{tabel}
0,723	52,2%	8,81	0,001	1,666

Based on table 6, it can be seen that $t_{hitung} > t_{tabel}$ or 8,81 >1,666 and sig < α or 0,001 < 0,05, it can be concluded that there is a significance influence between the ability to think creatively in mathematics on the ability to solve mathematical problems in class VIII students of SMP Negeri 2 Ladongi . The magnitude of the coefficient of determination R square obtained is 0.522. The meaning of the coefficient is that the influence of mathematical creative thinking ability is 52.20%. In the process of solving problems, students need the ability to think creatively about a mathematical concept. The ability to think creatively is a person's ability to give birth to something new, both in the form of ideas and concrete works that are relatively different from those that existed before (Rahman, 2012), so that the ability to think creatively really needs to be improved by students so that they can complete tasks in lesson.

Tabel 7. Corelation Coeficient Analysis Result For Y and X_2 when X_1 Constant

Koefisien korelasi (r)	Koefisien determinasi (KD)	t_{hitung}	Signifikasi	t_{tabel}
0,331	11,00%	2,96	0,004	1,666

Based on table 7, it can be seen that $t_{hitung} > t_{tabe}$ or 3,10 > 1,666 and sig < α atau 0,004 < 0,05 , it can be concluded that there is a significance influence between basic mathematical abilities on the mathematical problem solving abilities of class VIII students of SMP Negeri 2 Ladongi. The magnitude of the coefficient of determination R square obtained is 0.11. The meaning of these coefficients is that the influence given by basic mathematical abilities is 11%. The basic ability of mathematics is an important thing for students to have where the basic ability of mathematics is the initial foundation that will be used as a provision for students to receive higher concept mathematics learning material. This is in accordance with the opinion of Slameto (Mardiyanti and Abdulah, 2018: 50) the basic abilities that students have before starting a new lesson, have an influence on the ability of students to understand the subject matter they will face. Therefore, the basic abilities of mathematics need special attention to these basic abilities because these basic abilities will become the initial foundation for students to solve problems related to mathematics.

D. CONCLUSIONS

Students' mathematical creative thinking abilities are in the quite creative category with an average score of 54.19, students' basic mathematical abilities are in the moderate category with an average score of 54.34, students' mathematical problem solving abilities are in the low category with an average score 41.92. There is a significance influence on the ability to think creatively in mathematics and basic mathematical ability on the ability to solve mathematical problems in class VIII students of SMP Negeri 2 Ladongi with a determination value of 65.20%, while 34.8% is influenced by other variables.

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