Effect of the Missouri Mathematics Project model on mathematical creativity

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Abstract. The ability of creativity needs to be the focus in learning mathematics because achievements in learning mathematics develop students' mathematical creativity abilities. The purpose of this study is to determine the effect of the Missouri Mathematics Project model on students' mathematical creativity abilities. The research method used is an experimental method using purposive sampling techniques with instruments that use tests and questionnaires. The results of research on student responses in the Missouri Mathematics Project model obtained 87.72% who responded positively, with the value of students' mathematical creativity ability obtained 81.30 so that it can be said to be good. The research hypothesis test results obtained tcount> ttable (7.14> 2.02) that is the results can be accepted. The conclusion is that there is a positive influence on the Missouri Mathematics Project model with students' mathematical creativity abilities.

1. Introduction

Indonesia has all levels of education from basic education to university level. Each level of education has different educational goals. But if the researcher can conclude there is a common goal given the general objectives of education in Indonesia, which refers to Government Regulation No. 19 of 2005 concerning National Education Standards Article 26 that the purpose of education in Indonesia is to lay the foundation of intelligence for basic levels, personalities, characters, and noble skills and follow further education [1].

The development of science and education is the basis of modern society [2,3], therefore the progress of a nation is determined by an educational perspective. education is often interpreted by people differently, depending on their point of view and the theory of education is believed to be true. Differences in the interpretation of education in the academic context are common this can enrich the treasury of human thought and is useful for the development of theory.

From year to year, the main problem faced by the Indonesian people is the low quality of formal education at every level of education. The low quality of education in Indonesia can be seen from the results of a report from the 2015 PISA program which reported 62 out of 70 countries with competencies in science learning reaching an average of 403, an average of 397, and the results of Mathematics competencies obtained an average of 386 [4-10]. This was also reported by TIMSS in 2015, Indonesia was ranked 44th out of 56 participating countries with an average score of students' math scores in class IV which was 397 below the average score of 500 [9,11-13]. This shows that specifically elementary schools are still weak in mathematical creativity in Indonesia because they have not shown satisfactory results.
From the observations of researchers at MI At-Taqwa School 17, Pondok Soga Sub-District, Bekasi Regency, one of the problems with the low learning outcomes of Mathematics is that students do not look enthusiastic when the teacher explains mathematics material in front of the class. This is because the concept of learning mathematics taught by the teacher is classic through conventional learning models and looks lacking in preparing learning material, not to mention the teacher is not enough to master the learning material.

Another problem shows that the mathematics grades in class IV MI At-Taqwa 17 Mandala Pondok Soga District Bekasi District show that 65 while the Minimum set is 73, so there are still around 50% of students under 73 or around 50% who have not yet reached the KKM. The reason for the low creativity of mathematics is also the use of learning methods that are still monotonous with learning methods that are conversational so that students tend to be passive, not given many opportunities for independent learning so students quickly feel bored in the learning process in class. Mathematical creativity shows broad categories that include learning goals and learning objectives [14,15]. Determining mathematical creativity is very important using the right learning model so that learning outcomes can achieve satisfying results.

Some researchers say that mathematical creativity is very important to develop in the learning process, so students can get something new and stimulate their ability to think creatively [16-20]. One of the efforts in developing mathematical creativity in fourth-grade students of MI At-Taqwa 17, Pondok Soga Subdistrict, Bekasi Regency is by applying the Missouri Mathematics Project Model. The Missouri Mathematics Project model is a structured learning model with the development of ideas and the expansion of mathematical concepts [21].

The Missouri Mathematics Project model requires students to be active in learning with the teacher as a facilitator who helps and helps students find their knowledge. Students are introduced directly to real objects to increase student motivation to learn and master mathematics subject matter. The Missouri Mathematics Project model is a learning model that consists of several steps, namely (1) introduction or review; (2) development; (3) practice with the guidance of the teacher; (4) independent work; and (5) cover. So the Missouri Mathematics Project Model was discovered empirically through research and consisted of several steps, namely daily review, development, controlled exercises / cooperative learning, independent training, and homework.

Previous studies have found that the use of the Missouri Mathematics Project Model can be concluded that (1) Student mathematics learning achievement taught by using the Missouri Mathematics Project Model is as good as its achievement. emotional intelligence that is taught, (2) Mathematical achievement of students with high emotional intelligence is better than students with low media and emotional intelligence, and mathematical achievement of students with emotional intelligence is as good as students with low emotional intelligence in a straight line equation, (3) Each learning model, mathematics learning achievement of students with high emotional intelligence is better than students. with medium and low emotional intelligence, and mathematical achievement of students with emotional intelligence as good as students with low emotional intelligence in a straight line equation (4) For each category of high and medium emotional intelligence, mathematical achievement of students taught using the Missouri Mathematics Project Model is better than students' mathematical achievements.

Based on the results of the research analysis above, Mathematics learning for MI grade IV At-Taqwa 17 Pondok Soga Bekasi District, the title of the study "The Effect of Missouri Mathematical Model Projects on Mathematical Creativity."

2. Methods
This study uses one class, namely the experimental class using the Missouri Mathematics Project Model to determine students' mathematical creativity abilities and is given a final test (posttest), a sample of 44 students using a purposive sampling technique. Data collection techniques in this study were questionnaire and test. The results of the trial of the instrument conducted with 35 MI class IV At-Taqwa 17 students at Pondok Soga Bekasi District obtained the validity of the test instrument number 1 \( r_{xy} = 0.411 \) then consulted with the \( r_{xy} \) table at 95% confidence level and obtained \( r_{xy} \) table = 0.3338. The
reliability test results can be seen in the obtained value of Cronbach's Alpha of 0.754 or included in the high category.

The data analysis technique used was the normality test, the homogeneity test, the linearity regression test, the regression equation, and the model goodness test. Hypothesis testing in this study is; If $t > t_{table}$, then $H_0$ is rejected; If $t_{count} < t_{table}$, then $H_0$ is accepted. If the value Probability/Significance/P-value <, then $H_0$ is rejected; If the value Probability/Significance/P-value >, then $H_0$ is accepted. The next $t_{count}$ price is $t_{table}$ for $= 0.05$ and $df = n-K−1$. Calculations using SPSS version 26.0.

3. Results
In this study, researchers took samples of MI class IV At-Taqwa 17 Pondok Soga Bekasi District, amounting to 44 people. In conducting experiments the researchers conducted questionnaires and tests. The form of the testing instrument was a questionnaire of 20 statements, while the test consisted of 7 essay questions.

3.1. Student responses to the Missouri Mathematics Project Model
To determine students' responses to the Missouri Mathematics Project model used in the Mathematics learning process, the authors conducted a questionnaire containing 20 statements addressed to 44 students in the experimental class. The data obtained are independent variable data (variable X). The questionnaire uses a Likert scale.

The distribution of questionnaires obtained scores, description of student response data using the SPSS Version 26.0 program. From the number of respondents as many as 44 students. The questionnaire distributed to students after learning using the Missouri Mathematics Project model obtained a mean score of 83.95, a standard deviation of 6.023, a minimum value of 70, and a maximum value of 94. This means that the average score on the Missouri Mathematics Project model is strong/good because there are in the range 61-80.

As for students' responses to the Missouri Mathematics Project learning model. When viewed from each item of the questionnaire statement totaling 20 items, it can be interpreted that there are 87.72% who gave a positive response to the Missouri Mathematics Project model. The neutral student response was 11.67%, and the negative student response was 0.61% towards the Missouri Mathematics Project model. This can be presented in indicators, as follows:

- Student Response That the Missouri Mathematics Project Model can make students easier in learning is 91.36% which is included in the very strong category.
- Student responses that the existence of a learning group makes students happy in learning is 86.59% which is included in the very strong category.
- Students' response that with two exercises in each learning makes students happy in learning is 84.56% which is included in the very strong category.
- Student responses that students can express their opinions about the learning model provided is 80.91% which is included in the strong category.
- Student responses that students feel more interested in learning by using new learning is 81.36% which is included in the strong category.
- Student responses that students feel more challenged to do the exercises given by the teacher is 77.27% which is included in the strong category.
- Student responses that students will be more skilled in working on a variety of questions amounted to 76.82% which is included in the strong category.
- Student responses that students will try to do the problems by themselves amounted to 82.72% which is included in the very strong category.
- Student responses that students can work on problems promptly. amounted to 76.36% which is included in the strong category.
- Student responses that teachers can give students to be active and creative in learning amounted to 85.91% which is included in the very strong category.
• Student responses that teachers always motivate students so that students are enthusiastic in learning amounted to 87.73% which is included in the very strong category.
• Students' response that the teacher can make the lesson more interesting and effective is 90.00% which is included in the very strong category.
• Student responses that teachers can make students dare to move forward are 80.91% which is included in the strong category.
• The response of students that teachers can make students' mathematical creativity abilities better is 91.36% which is included in the very strong category.

Based on the above it means that the Missouri Mathematics Project model makes it easier for students to understand the material and makes students' mathematical creativity abilities better.

3.2. Students' mathematical creativity ability
Students' mathematical creativity ability is measured by a student's Math ability test after students get the Missouri Mathematics Project model. From the number of students who took the test as many as 44 students. tests that were distributed after applying the Missouri Mathematics Project model obtained a mean score of 81.30, a standard deviation obtained of 11.699, as well as a minimum value of 60 and a maximum value of 97. The mean value of 81.30 indicates the average value of students on good test questions.

3.3. Data analysis

3.3.1. Normality test. Normality test is carried out to find out whether the data is normally distributed or not. The statistical test that will be used is the Kolmogorov-Smirnov test by taking a significant level of 0.05. The test criteria are H₀ is accepted if the significant value > 0.05 and H₀ is rejected if the significant value < 0.05. Output using computer program calculation software SPSS version 26 for windows. The results of normality test data with a level of confidence α = 0.05 obtained a significant value (sig) in the Sig column with a value of 0.200 > 0.05 it can be interpreted that the data is normally distributed.

3.3.2. Homogeneity test. By using the computer program calculation software SPSS version 26.0 for windows. Homogeneity test calculation results show that the Missouri Mathematics Project questionnaire model and the test of students' mathematical creativity ability are homogeneous because the significance value is more than 0.05. This shows that both values have the same variance.

3.3.3. Linear regression test. From the results of calculations using the SPSS version 26.0 program. can be seen that the results of calculations for the linearity test of regression obtained sig. equal to 0.000, because the significance value is less than 0.05. Thus H₀ is rejected and Hₐ is accepted. This means that between the Missouri Mathematics Project model variables with students' mathematical creativity abilities there is a linear relationship.

3.3.4. Regression coefficient test. From calculations using the SPSS software program version 26.0, it can be obtained data from the calculation results for the regression test we can conclude that t_count > t_table is 7.140 > 2.020, then H₀ is rejected meaning that there is a significant influence between learning by using the Missouri Mathematics Project model of students' mathematical creativity abilities. Thus the equation for the two variables is -39.455 not included in the model because it is not possible when before using the Missouri Mathematics Project model of students' mathematical creativity ability of -39.455. The regression coefficient of 1.438 states that each additional use of the Missouri Mathematics Project model will affect the ability of students' mathematical creativity by 1,438. A positive coefficient means that there is a positive relationship between learning the Missouri Mathematics Project with the ability of mathematical creativity. The higher the Missouri Mathematics Project learning, the more the ability of mathematical creativity increases.
3.3.5. Model goodness test. From the results of calculations using SPSS version 26.0, it was found to have a coefficient of determination (R Square) of 0.548. This means that 54.8% of the mathematical creativity variable (y) is explained by the Missouri Mathematics Project (x) model use variable, and the remaining 45.2% (100% - 54.8%) is explained by other variables beyond the variable used. Variables that can affect include the condition of students and individual abilities of students.

3.3.6. Hypothesis testing. The results of the analysis of SPSS Version 26.0 show the t value of 7.140 and the significance of 0.00. For t tables sought at a significant level of 5% with degrees of freedom 44-2-1 = 41. With 2-sided testing (significance = 0.05) results obtained for a table of 2.020. Because t\text{count} (7,140) > t\text{table} (2,020) then H₀ is rejected. This means that there is an influence on the Missouri Mathematics Project model on students' mathematical creativity abilities.

4. Discussion
The Missouri Mathematics Project model is a structured learning model that includes things that can make students' time effective in learning, namely reviewing previous material, developing new ideas as an extension of previous mathematical concepts, providing control exercises (groups), and giving independent assignments to students. Therefore, the development of new ideas and the provision of lots of exercises make students more creative and skilled in solving various problem problems. Based on the data processing carried out, that there is a linear relationship between the Missouri Mathematics Project model with mathematical creativity of = 1,438 X. A positive value coefficient means that there is a positive relationship between the Missouri Mathematics Project model and the ability of mathematical creativity, the higher the Missouri Mathematics Project learning, the more ability increases mathematical creativity.

The statement above is proven by obtaining an average score of students' mathematical creativity ability of 81.30 and an average questionnaire of 83.95. From the results data description, this questionnaire generally shows positive student responses to the Missouri Mathematics Project model. The response to the application of the Missouri Mathematics Project Model seems to make students easier to understand the material and make students' mathematical creativity better. The effect of the Missouri Mathematics Project model for students can be known from the calculation of the correlation test and hypothesis test (t\text{test}) where the value of r_{XY} = 0.740. This means there is a very strong relationship between variable X with variable Y. Likewise, the results of the acquisition of regression, with t\text{count} = 7.140 and t\text{table} = 2.020. Because t\text{count} 7.140 > 2.020, H₀ is rejected and Hₐ is accepted. This means that there is a significant influence of variable X on Y. From the results of these studies indicate that said the Missouri Mathematics Project learning can improve the ability of mathematical creativity in students.

5. Conclusion
From the results of research conducted in class IV MI At-Taqwa 17 Pondok Soga District Bekasi District with data collection tools such as tests and questionnaires, it can be concluded as follows: 1) Student responses to the Missouri Mathematics Project model in learning activities can be known from students towards the application of the Missouri Mathematics Project model is 87.72 (38 students) who respond positively; 2) The learning outcomes of the experimental class applying the Missouri Mathematics Project learning, obtained an average score of students' mathematical creativity ability of 81.30 which included good categories. This shows that the ability of students' mathematical creativity after applying the Missouri Mathematics Project model increases well; 3) The effect of the Missouri Mathematics Project learning model on students' mathematical creativity ability can be seen from the results of the hypothesis test which shows that t\text{count} (7.140) is greater than t\text{table} (2.020) then H₀ is rejected, meaning that there is an influence of the Missouri Mathematics Project model on students' mathematical creativity abilities. Also, the regression equation for the two variables is 1,438X, from the equation the regression coefficient is 1,438 which states that any increase in the Missouri Mathematics Project model will affect students' mathematical creativity abilities.
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