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The Influence of the Missouri Mathematics Project Learning Model on Students Mathematical Communication Skills

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Abstract

This research aims to determine whether there is an influence of the Missouri Mathematics Project (MMP) learning model on students' mathematical communication skills in class VIII cubes and cuboid at MTs Al-Khairiyah. This research is experimental research. The instrument used is a test in the form of an essay with seven questions. The population of this research is all students in class VIII MTs Al–Khairiyah for the 2022/2023 academic year, with a research sample of 67 students, selected using the purposive sampling technique. Data analysis prerequisite tests were carried out using the Normality Test (Liliefors) and the Homogeneity Test with Fisher's Test. Based on the results of hypothesis testing, t_{count}=1.7309 bigger than t_{tabel}=1.6679, it can be concluded that there is an influence of using the Missouri Mathematic Project learning model on the mathematical communication skills of class VIII students at MTs Al–Khairiyah.

Keywords: Cube and cuboid, Mathematical communication, Missouri mathematics project.

1 INTRODUCTION

In life, education plays a very important role in determining the success and progress of a nation. The purpose of education is to develop the potential of students to become human beings who believe and are devoted to God Almighty, have noble character, knowledge, capable, creative, independent, and become democratic and responsible citizens (Lena & Efron 2018).

Mathematics is one of the subjects that must be emphasized more from elementary school and even kindergarten to college age. Because studying mathematics is able to equip students to have the ability to think systematically, logically and analytically so as to help students in solving everyday problems.

The word mathematics comes from the Greek mathematikos meaning exact science, from the word mathema or mathesis which means teaching, knowledge, or science. The term Mathematics according to Latin (manthanein or mathema) means learning or thing learned, all of which have to do with reasoning. Based on the origin of the word, mathematics is a science that can be obtained through the process of thinking (reasoning).

While etymologically communication comes from Latin, namely or preposition which means "with" or "together" and the word umus or a number word meaning "one". These two words form the noun Communio. The word Communio in English means togetherness, unity, combined fellowship, association or relationship.

Communication according to the way it is delivered is divided into two types, namely verbal and non-verbal communication. Verbal communication is communication that uses words, both in the form of conversation and writing. This communication is most widely used in human relations. While non-verbal communication is communication whose message is packaged in a wordless form. In communicating, almost automatically non-

verbal communication is used. Therefore, non-verbal communication is fixed and always present.

According to Gida (2018), mathematical communication skills are students' ability to express mathematical thoughts, mathematical symbols, the ability to understand, interpret, explain mathematical terms and concepts both orally and in writing. Oral communication can be in the form of discussions, questions to explanation of concepts and strategies for solving a problem. While mathematical communication in writing, mathematical ideas can be expressed through scientific symbols such as pictures, diagrams, graphs of mathematical equations, or other mathematical notations.

Mathematical communication is important because mathematics is not only a thinking tool helping learners to solve problems and draw conclusions but also as a tool to convey mathematical thoughts, ideas and ideas to the form of mathematical symbols. There are several roles of communication in mathematics learning, which helps sharpen students' thinking and as a tool to measure students' comprehension ability and reflect on students' mathematical understanding.

But in fact, it shows that students' mathematical communication skills orally and in writing are currently still relatively low. Facts in the field also prove that students' mathematical ideas have not been conveyed well when faced with a mathematical problem , especially in problems related to pictures and the use of mathematical symbols. Students are less able to make conclusions and embarrassed when showing the results of their work to others, it will make it difficult for students to solve problems because they do not communicate well.

The same thing was also stated by MTs mathematics teacher Al-Khairiyah Mr. Samroni, S.Pd., in general, students' mathematical communication skills are still relatively low. Based on observations that have been made, researchers found that in the classroom teachers have not maximally used existing learning models and learning media. Some teachers use only the lecture method. Students do not play an active role in learning even some students do not understand the material but are embarrassed to ask questions, so only some students have good completeness criteria in mathematical communication with a minimum score of 75.

After the observations were analyzed, the researcher stated that it was necessary to use appropriate learning models to improve students' mathematical communication skills. A learning model that can improve students' mathematical communication skills is a learning model that provides flexibility for students to explore and discuss with other students. One of the learning models that can be used to improve mathematical communication skills is the MMP learning model (Aminuddin, Widya, Noviana 2020).

The MMP learning model is structured learning that includes review, development, controlled exercises, seatwork (independent work), and assignments (homework). The MMP learning model provides students with opportunities to work in groups in controlled exercise steps and apply students' own understanding with independent work in seatwork steps.

As stated by Devira and Endang (2019: 3) MMP is a learning model that involves learning with teachers positioning themselves as facilitators who will accompany and assist students in the problem-solving process, students as subjects not as objects so that students will learn actively in learning.

Through the MMP learning model, students are given the opportunity to develop their ability to understand concepts while fostering confidence through exercises, both in groups and individually. By studying in groups, students can convey ideas or opinions in their own language. In addition, students' initial abilities and repetition of the material are also given special attention to this model. With the activeness and interaction of students in learning, it is suspected that they can hone the mathematical communication skills of students optimally so that students are not only smart but also have character.

Several research results revealed that the use of the MMP learning model can affect students' mathematical communication skills such as research conducted by Erizka (2019) at SMP Negeri 6 Tanjung Pinang obtained results that there was an increase in

mathematical communication skills by 0.509. Mulyanti's research (2022) at SMA Negeri 7 Pinrang found that there were differences in students' mathematical communication skills before and after learning using the MMP learning model. With this, researchers tried to use the MMP learning model to determine its effect on students' mathematical communication skills. The formulation of the problem in this study is "Does the MMP learning model affect students' mathematical communication skills?". The purpose of this study was to determine whether there is an influence of the MMP learning model on students' mathematical communication skills on cube and cuboid material.

2 RESEARCH METHODS

The approach used in this study is a quantitative approach with the type of experimental research carried out at MTs Al-Khairiyah. This study using the Posttest Only Control Group research design.

The population of this study is all grade VIII MTs Al–Khairiyah students for the 2022/2023 academic year, with a research sample of 67 students, selected by the Purposive Ssampling technique. For data collection in this study using a test instrument in the form of an essay as many as seven questions, on cube and cuboid material.

3 RESULT AND DISCUSSION

3.1 Mathematical Communication Skills

The results of this research are data on students' mathematical communication skills test scores, the impact of the application of the MMP learning model in experimental classes and conventional learning in control classes. Test scores of students' mathematical communication skills in obtained from the posttest.

Based on the data obtained from the results of testing students' mathematical communication skills with test instruments in the form of essay questions consisting of 35 students in the experimental class can be described as follows: average value (mean) = 82.5429; median (Me) = 91; mode (Mo) = 91; standard deviation = 15.8625; maximum value = 100; and minimum value = 43. Data on mathematical communication skills test scores of experimental class students can be presented as shown below:

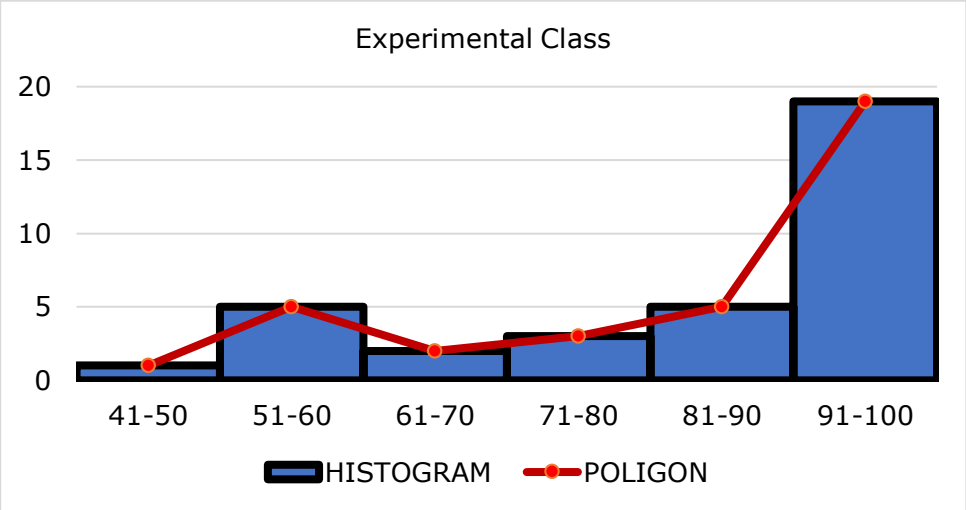

Figure 2. Histograms and Polygons of Experimental Class Frequency Distribution

While the data obtained from the results of testing the mathematical communication skills of control class students can be described as follows: average value (mean) =

75.2813; median (Me) = 80; mode (Mo) = 91; standard deviation = 17.9552; maximum value = 100; and minimum value = 43. Data on mathematical communication skills test scores of control class students can be presented as shown below:

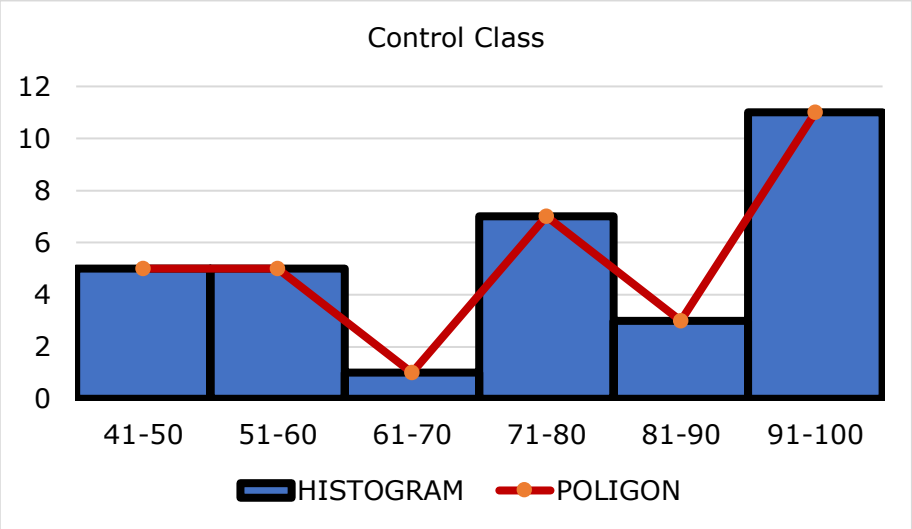

Figure 3. Control Class Frequency Distribution Histograms and Polygons

Before the hypothesis test is carried out, a prerequisite test is first carried out on the data obtained, the prerequisite analysis test consists of a normality test and a homogeneity test.

3.1.1 Normality tes

A normality test is performed to find out whether the data to be analyzed is normally distributed or not. The results of the normality test calculation is presented in Table 1.

Table 1. Normality Test Results

Class	n	α	L_{count}	L_{table}	Remark
Experiment	35	0.05	0.1399	0.1478	Normal
Control	32	0.05	0.1114	0.1542	Normal

Based on the results of the normality test calculation above, it shows that the data from the experimental class and the control class obtained L_{count} is smaller than L_{table}. Because 0.1399 smaller than 0.1478 and 0.1114 smaller than 0.1542 at the significant level α=0.05, then it can be concluded that the normality test results are normally distributed.

3.1.2 Homogenity test

A homogeneity test is performed to find out whether the sample comes from the same variance or not (homogeneous). The results of the homogeneity test calculation can be seen in Table 2.

Tabel 2. Homogeneity Test Results

Class	Variance	n	F_{count}	F_{table}	Remark
Experimen	259.0202	35	0.7783	1.8055	Homogeneous
Control	332.7893	32			

Based on the results of the homogeneity test calculation above, it shows that the data derived from the experimental class and the control class obtained F_{count} is smaller than F_{table}. Because 0.7783 smaller than 0.8055 at a significant level α=0.05, then it can be concluded that the sample comes from a homogeneous population.

3.1.3 Test of the Hypotesis

After it was known that the results of the posttest data on the mathematical communication skills of experimental class students and the control class were normally distributed and homogeneous, then a hypothesis test was carried out. Hypothesis testing is performed using the *t*-test. The results of the *t*-test calculation can be seen in Table 3.

Tabel 3. Hypotesis Test Result

Class	n	t_{count}	t_{table}	Remark
Experiment	35	1,7309	1,6679	Different
Control	32			

Based on the results of the calculation of the hypothesis test above, it shows that the data derived from the experimental class and the control class obtained t_{count} is bigger than t_{table}. Because 1.7309 bigger than 1.6679 at a significant level α=0.05, then it can be concluded that there is an influence of the use of the MMP learning model on students' mathematical communication skills on cube and cuboid material.

3.2 Interpretation of Research Results

Based on studies and research that has been conducted, the use of the MMP learning model affects students' mathematical communication skills. Judging from the results of the calculation of the hypothesis test using the t test, the value obtained t_{count}=1.7309 bigger than t_{table}=1.6679, so it can be concluded that there is an influence of the use of the MMP learning model on students' mathematical communication skills on cube and cuboid material.

The results of this study are in line with the results of Mulyanti's (2022) research, namely experimental research that aims to determine the effect of using the MMP learning model on students' mathematical communication skills. Mulyanti further stated that the results of research and hypothesis testing, there were differences in students' mathematical communication skills before and after learning using the MMP learning model.

This is because the MMP learning model, is a structured learning model that contains things that can streamline student time in learning, namely reviews of previous material, the development of new ideas as an expansion of previous mathematical concepts, the provision of control exercises (groups), and the provision of independent assignments to students.

Similarly, with the results of Erizka's (2019) research, the value of students' mathematical communication skills before and after using the MMP learning model showed a positive increase with an average increase of 0.509. The results of the study can be stated that mathematics learning with the MMP learning model can be used as an alternative in developing students' mathematical communication skills.

The results of previous research turned out to be in line with the results of this study, that the use of the MMP learning model can affect students' mathematical communication skills. But there are still differences with this study, Mulyanti's research looks at the influence of the application of the MMP learning model on mathematical literacy skills in a gender perspective. Meanwhile, Erizka's research focuses on the effect of using the MMP learning model in collaboration with Talking Chips.

Based on the data obtained from the posttest, there is a positive influence on the use of the MMP learning model on students' mathematical communication skills. Thus, the research succeeded in proving the research hypothesis proposed that there was an effect of using the MMP learning model on the mathematical communication skills of grade VIII students at MTS Al-Khairiyah South Tambun.

4 CONCLUSION

There was a difference in the average score on students' mathematical communication skills on the cube and cuboid material of the experimental class using the MMP learning model was higher than the mathematical communication skills of control class students. This is supported by the results of hypothesis testing using the t test obtained t_{count} is bigger than t_{table}. This shows that there is an influence on the use of the MMP learning model on the mathematical communication skills of grade VIII students at MTS Al–Khairiyah Tambun Selatan for the 2022/2023 academic year.

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