THE USE OF REALISTIC MATHEMATICS EDUCATION TO APPROACH AS AN EFFORT TO IMPROVE MATH COMMUNICATION SKILLS

Romadhon Kuswantoro [a], Abdul Taram[b]
Program Studi Pendidikan Matematika Universitas Ahmad Dahlan
Jalan Ring Road Selatan, Tamanan, Banguntapan, Bantul Yogyakarta[a]
romadhonkuswantoro@gmail.com , [b]Abdul.taram@pmat.uad.ac.id

Abstract

Problems about the low mathematical communication skills of students are still found in Junior High School (SMP) Muhammadiyah 2 Minggir. Based on the problem above, the researcher is interested in research to improve students' mathematical communication skills using the Realistic Mathematics Education (RME) inset material to class VII of SMP Muhammadiyah 2 Minggir in the academic year 2019/2020. The type of research used in this study is classroom action research (CAR). This study's subject was students grade VII class B of SMP Muhammadiyah 2 Minggir in 2019/2020, consisting of 29 students. This study's object is implementing the mathematics learning process through Realistic Education Learning approaches to improve students' mathematical communication skills. Data collection techniques used by researchers are observation, tests, and interviews. After obtaining the data, then the data is processed by triangulation techniques and calculated using Microsoft Excel. Based on the calculation results of mathematical communication skills in students grade VII class B of SMP Muhammadiyah 2 Minggir, which have been measured with indicators of mathematical communication abilities, the average percentage of mathematical communication abilities of students in the first cycle is 59%, which is included in the excellent category. The percentage increased to 75.19% in the second cycle or after being given an action using a learning approach to realistic mathematic educations with the category "Good" and increased mathematical communication skills 67.09%.

Keywords: Mathematical communication skills, classroom action research, Realistic Mathematics Education

INTRODUCTION

Mathematics equips students to have the ability to think logically, analytically, systematically, critically, and the ability to cooperate. Mathematics is one of the most important disciplines (Paruntu, Sukestiyono, and Prasetyo, 2018:27). According to the Department of National Education (in Chotimah, 2015: 1), mathematics has an important role in developing the power of human thought, so mathematics becomes the foundation in modern technology development. Mathematics is also used as a communication tool in everyday life.

Mathematical communication skills of students are the ability of students to convey mathematical ideas. The students' mathematical communication ability reflects the understanding of mathematics and the learners' misconceptions (NCTM, 2000). Students' mathematical communication skills are one of the abilities to be achieved in learning mathematics. One of the goals to be achieved in learning mathematics is to provide opportunities for students to develop communication skills, both verbally and in WritingWriting. Communication skills are included in one component in the standard process of mathematics in schools (Hajj, 2012: 115). Teachers also use communication to determine the ability of students to understand the material provided.

Mathematical communication can occur well when there is communication between the teacher and students; students understand what is conveyed by the teacher, and students can express what they receive. The mathematical communication indicators according to the National Council of Teachers of Mathematics (NCTM) (in Hendriana et al. 2017: 62), namely (1) Modeling the situation using pictures, graphics, and algebraic expressions, (2) Expressing and explaining thoughts about ideas and mathematical situations, (3) Explaining mathematical ideas and definitions, (4) Reading, listening, interpreting, and evaluating mathematical ideas, (5) Discussing mathematical ideas and making guesses and convincing

reasons and (6) Respect the value, mathematical notation, and its role in everyday problems and the development of mathematics and other scientific disciplines. According to Kadir (in Hodiyanto, 2017: 13), measuring mathematical communication abilities is done by giving scores to students' writing abilities (written text), Drawing, and Mathematical expression.

Education must direct the students to the using of any situations and chance to reinvent mathematics in their way (Lestari and Surya (2017: 92). The statement is reinforced by the opinion of (Laurens and friends, 2018:571)) the best way to teach mathematics is to provide students with meaningful experiences by solving issues that they face every day or in other words by dealing with contextual problems. Susilowati (2018: 46) believes that Realistic Mathematics Education (RME) is an alternative learning model that requires students to construct knowledge with their abilities through the activities carried out in learning activities. This is in line with Tarigan (2006: 4) realistic mathematics education approach that is oriented towards students' reasoning that is realistic and by curriculum demands aimed at developing a practical, logical, critical, and honest mindset with orientation on mathematical reasoning in solving problems. RME aims to change mathematics learning into more fun and meaningful for students by introducing them to problems within contexts (Laurens and friends (2018:571).

METHOD

This research is classroom action research (CAR). The time used in conducting research is from September 27, 2019, until October 21, 2019. This research was carried out at SMP Muhammadiyah 2 Minggir, Sleman, Yogyakarta. This study's subjects were students grade VII class B of SMP Muhammadiyah 2 Minggir in 2019/2020, consisting of 29 students. This study's object is implementing mathematics learning through realistic mathematics education learning approaches to improve students' mathematical communication skills. Data collection techniques used by the researcher is observation, test, and interview. The data obtained is then processed by triangulation techniques and calculated using Microsoft Excel. After obtaining the data, then the data is processed by triangulation techniques and calculated using Microsoft Excel.

RESULT AND DISCUSSION

The study was conducted in the II cycle with four stages: the planning stage, the implementation phase, the observation phase, and the reflection stage. During the learning process cycle I and II, the learning model used is a realistic learning model of realistic mathematics education. In one cycle, there were four meetings. The results of this research during the learning activities are as follows:

1. Planning stage. The planning stage is carried out in two-cycle cycles, which are cycle I and cycle II. The planning stage in cycle I and cycle II involves the researchers drawing up the lesson plan and making the research instrument. At the instrument preparation stage, the researcher makes the instruments used in the study carefully by looking at the guidelines. Before the instrument is used, the instrument made is first consulted and approved by the experts.
2. Implementation stage. The first cycle of research at four meetings showed the meeting results (1) students had not been given learning material. At this meeting, students only make introductions and do a pretest to measure students' initial abilities. The result of the pretest can be seen in table 1. Based on the pretest calculations' result in table 1, the average value of students is 52.490. If seen in the index criteria of mathematical communication of students, it can be concluded that the students' mathematical communication ability included in the low category; at meetings (2) and (3) students are given learning material that is already connected with daily life and applied a realistic learning model of realistic mathematics education type; while in meeting (4) students do a post-test to measure the students' ability, whether an increase or decrease. Based on the post-test calculation results in table 1, the average value of students is 65.517. If seen from the mathematical criteria index of students' communication, it can be concluded that after applying the RME learning method, students' mathematical communication ability is included in the good category.

Table 1. The Result of Pretest and Post-test Calculation in Cycle I

No.	Respondent Name	Pretest	Posttest	No.	Respondent Name	Prestest	Posttest
1	ASD	91,67	50,00	16	NA	58,33	83,33
2	ANA	83,33	41,67	17	NEA	41,67	75,00
3	AP	25,00	50,00	18	NF	83,33	58,33
4	ADE	58,33	83,33	19	PDA	58,33	75
5	BAA	25,00	58,33	20	RPA	33,33	41,67
6	ESEP	16,67	58,33	21	RLA	66,67	58,33
7	FD	58,33	100	22	RM	75,00	50,00
8	FAT	75,00	83,33	23	RK	58,33	50,00
9	H	41,67	100	24	RDMT	75,00	50,00
10	HAP	33,33	41,67	25	SAA	66,67	91,67
11	HAP	66,67	41,67	26	VFF	50,00	83,33
12	LA	50,00	83,33	27	VAP	58,33	66,67
13	MM	75,00	83,33	28	YM	66,67	91,67
14	ME	33,33	100	29	YNS	50,00	41,67
15	MA	16,67	50,00	Average		52,490	65,517

Based on the research results in table 1, the students' initial ability was classified into the low category while in the pretest time. After applying realistic learning models of realistic mathematics education type at meetings 2 and 3, students' ability is better than before. The increase in student ability can be seen from the results of the post-test.

While the second cycle of research at the meeting (I), students are given a pretest to determine their initial ability. After taking action in the first cycle, the pretest results can be seen in table 2. Based on the results of the pretest calculation in table 2, it obtained an average student score of 71,648. If seen through the index criteria of students' mathematical communication, it can be concluded that after the action in the first cycle, the initial ability of students' mathematical communication classified into the good category; at meetings (2) and (3) students are given learning material related to daily life and apply realistic learning models of realistic mathematics education types; at the meeting (4) students do a post-test to find out the increase or decrease in students' abilities. Based on the results of the post-test calculation in table 2, it obtained the average student score is 78.736. If seen in the index criteria of students' mathematical communication, it can be concluded that after applying the RME learning method, students' mathematical communication skills are included in a suitable category.

Table 2. The Result of Pretest and Post-test Calculation in Cycle II

No	Respondent name	Prestest	Posttest	No	Respondent name	Prestest	Posttest
1	ASD	83,33	83,33	16	NA	83,33	91,67
2	ANA	83,33	100	17	NEA	91,67	75,00
3	AP	41,67	58,33	18	NF	75,00	66,67
4	ADE	58,33	75,00	19	PDA	83,33	83,33
5	BAA	50,00	66,67	20	RPA	83,33	83,33
6	ESEP	58,33	58,33	21	RLA	75,00	91,67
7	FD	91,67	100	22	RM	58,33	75,00
8	FAT	83,33	100	23	RK	41,67	75,00
9	H	50,00	75,00	24	RDMT	83,33	50,00
10	HAP	83,33	83,33	25	SAA	83,33	100
11	HAP	83,33	100	26	VFF	91,67	66,67
12	LA	58,33	66,67	27	VAP	66,67	75,00
13	MM	83,33	100	28	YM	83,33	91,67
14	ME	50,00	75,00	29	YNS	83,33	75,00
15	MA	50,00	75,00	Average		71,648	78,736

Based on the research results in table 2, students had an excellent initial ability at the pretest time. After applying realistic learning models of RME types at meetings 2 and 3, the students' ability become better. The enhancement of student ability can be seen from the results of the post-test. Compared to the students' initial ability before and after the RME type realistic learning model was applied, the students' abilities improved to become very good.

3. Observation Stage. The first and second cycles' observation stage results showed that the students felt clumsy at the first meeting because they did not know the researcher. However, after getting to know the researchers, the students began to show enthusiasm. During eight meetings, students seemed enthusiastic during the learning process because the researcher's problems were related to daily life, so they quickly understood the problem. In other words, using realistic learning models of realistic mathematics educations on set material is a good combination to attract students' learning interests and improve students' abilities.
4. Reflection Stage. The research results in the first cycle will be discussed and evaluated by the researcher and observer to improve the second cycle. The researcher has reduced observation of learning activities, test questions, and student interviews in cycle II. From this stage, it is known that applying realistic learning models of realistic mathematics educations shows the average aspects of the assessment material reach the good criteria. Classroom action research, which consists of two cycles, namely cycle I and cycle II, by applying realistic learning models of realistic mathematics educations, shows an increase in mathematical communication skills in students grade VII class B of SMP Muhammadiyah 2 Minggir. Several attempts were made to improve students' mathematical communication skills with realistic learning models of realistic mathematics educations types, such as, while delivering the subject matter, some students did not pay attention to the researchers' explanations. Hence, the researcher sought to slip a short and interesting story related to daily life related to the subject matter to keep paying attention to the explanations. The researcher also gives a quiz in the form of guesses to students about mathematical symbols. The researcher speaks loudly and closes the door when explaining the learning steps to keep focused on learning. The researcher also uses the same math book to guide the subject matter to understand the learning material more efficiently. During the discussion session, the researcher gives every student different assignments evenly in the group so that the students in the group focused on doing their assignments. Researchers provide additional assignments for students who do not do their work. Researchers give questions

which the solutions must be worked out together with their groupmates so students in the group can cooperate. This is in line with the research conducted by Chotimah (2015: 26), which said the main components to improve students' mathematical communication skills include communicating ideas with symbols, tables, diagrams, or mathematical expressions to clarify situations or problems, and have an attitude of respect to the usefulness of mathematics in life, an attitude of curiosity, attention, and interest in learning mathematics as well as an attitude of tenacity and confidence in problem-solving. The similarities with what researchers do in research are researchers trying to make students appreciate the usefulness of mathematics in life, an attitude of curiosity, attention, interest in learning mathematics, and an attitude of tenacity and problem-solving.

Based on the results of the calculation of pretest and post-test post-test in cycle I and cycle II, the conclusion of the data can be seen in Table 3 below:

Table 3. Analysis of Mathematical Communication Skills in cycle I and II of students grade VII class B of SMP Muhammadiyah Minggir

Aspects of Mathematical Communication Skills	**Cycle Percentage (%)**			
	Cycle I		**Cycle II**	
	Pretest 1	**Posttest 1**	**Pretest 2**	**Posttest 2**
(Written text) explain the idea of an image or find a solution to a problem using your language	62,07	71,26	73,56	83,33
(Drawing) explain ideas or solutions to mathematical problems in the images	51,72	66,67	71,26	75,862
(a mathematical expression) state everyday problems or events using mathematical language	43,68	58,62	70,11	77,01
Average	52,49	65,52	71,65	78,73
The average score of pretest one and post-test 1	59,00		75,19	
Enhancement	67,10			

Based on the data above, every aspect of students' mathematical communication skills in cycle II has increased. In pretest 1, the first ability (written text) students had an average value of 62.07%, then increased to 73.56% in the second cycle. The ability to draw (Drawing) explains the ideas or solutions of mathematical problems in the form of drawings in cycle I of the pretest obtained 51.72% then succeeded in increasing to 71.26% in cycle II. The mathematical expression ability (a mathematical expression), which states the daily problems or events using their mathematical language in the pretest of the cycle I obtained 43.68% results, then in the cycle II increased by 70.11%. Whereas for the post-test scores, after researchers applied realistic learning types of realistic mathematics educations in the classroom, students' ability to write (written text) to explain ideas or solutions to a problem in pictures using their language increased in post-test one by 71.26%, increasing to 83.33% in the cycle II. The ability to draw (Drawing) explains the ideas in the picture or find solutions to mathematical problems in the cycle I post-test, which obtained 66.67% results successfully increased to 75.862% in the cycle II. The mathematical expression ability that states the problems or events encountered in everyday life using the mathematics itself in the post-test cycle, I obtained 58.62% results. In cycle II increased to 77.01%.

Improvement in every aspect from cycle I to cycle II occurs because researchers can find deficiencies in cycle I. Subsequently, these deficiencies are used and corrected to make a lesson plan in cycle II. In cycle II, students spontaneously work on assignments given by the teacher. Students stay focused and do not affect the conditions outside the classroom. Students have dared to ask the teacher and his friend when they do not understand or comprehend the material presented. Students can answer questions from friends in one group or other groups. Students want to teach friends who have difficulty learning, and all students carry math books. Students want to help friends who are having difficulties and

divide tasks into groups; they dare express their opinions. Most students raise their hands to conclude the material they have learned.

Students' responses to the application of realistic learning models of realistic mathematics educations type were very good, as seen from the interviews with students in grade VII class B. From the interview, these are the following results:

1) Get positive responses from students about applying realistic learning models of realistic mathematics educations to the learning of mathematics in set material.
2) Students feel enthusiastic about implementing realistic learning models of realistic mathematics educations because, in learning, researchers use examples relating to daily life so that the classroom atmosphere is not too tense when learning.
3) Students become more confident and are brave when they do the presentation in front of the class.
4) Students want to ask and answer the questions and state their arguments bravely.
5) The realistic learning model type realistic mathematics educations can be a reference for further mathematics learning on certain material.

Overall, learning mathematics by applying realistic learning models of realistic mathematics educations can improve students' mathematical communication skills. Real learning models of realistic mathematics educations can be a reference for further mathematics learning. So, the hypothesis in this study is accepted.

CONCLUSION

Based on the results of research and discussion, it can be concluded that the application of realistic learning models of realistic mathematic educations in mathematics learning can improve mathematical communication skills in students grade VII class B of SMP Muhammadiyah 2 Minggir. The results of the following research can present this: Aspects of students' mathematical communication skills has increased, there are in pretest one the first ability (written text) students had an average value of 62.07%, then increased to 73.56% in the second cycle. The ability to draw (Drawing) explains the ideas or solutions of mathematical problems in the form of drawings in cycle I of the pretest obtained 51.72% then succeeded in increasing to 71.26% in cycle II. The mathematical expression ability states the daily problems or events using their mathematical language in the pretest of the cycle I obtained 43.68% results, then in the cycle II increased by 70.11%. Whereas for the post-test scores, after researchers applied realistic learning types of realistic mathematics educations in the classroom, students' ability to write (written text) to explain ideas or solutions to a problem in pictures using their language increased in post-test one by 71.26%, increasing to 83.33% in the cycle II. The ability to draw (Drawing) explains the ideas in the picture or find solutions to mathematical problems in the cycle I post-test, which obtained 66.67% results successfully increased to 75.862% in the cycle II. The mathematical expression ability that states the problems or events encountered in everyday life using the mathematics itself in the post-test cycle, I obtained 58.62% results. In cycle II increased to 77.01%. This is by the study's objectives, namely to improve students' mathematical communication skills by using realistic learning models of realistic mathematics education types. Based on the calculation results of mathematical communication skills in students grade VII class B of SMP Muhammadiyah 2 Minggir, which have been measured with indicators of mathematical communication abilities, the average percentage of mathematical communication abilities of students in the first cycle is 59%, which is included in the sufficient category, increasing to 75.19 % in cycle II or after being given an action using a realistic learning model of realistic mathematic educations with the "Good" category. Thus, the research objective is to find out whether using a realistic learning model of realistic mathematics education type can improve students' mathematical communication skills otherwise successful.

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