

The effect of learning realistic mathematics education (RME) Approach to improve students' mathematical communication

by Darto Darto

Submission date: 31-Mar-2022 08:05AM (UTC+0700)

Submission ID: 1797418134

File name: The_effect_of_learning_realistic_mathematics_educa.pdf (936.96K)


Word count: 2541

Character count: 14506

PAPER · OPEN ACCESS

The effect of learning realistic mathematics education (RME) Approach to improve students' mathematical communication

To cite this article: Darto 2021 *J. Phys.: Conf. Ser.* **1776** 012003

 View the [article online](#) for updates and enhancements.



IOP ebooksTM

Bringing together innovative digital publishing with leading authors from the global scientific community.

Start exploring the collection—download the first chapter of every title for free.

The effect of learning realistic mathematics education (RME) Approach to improve students' mathematical communication

Darto

Mathematics Education Department, Universitas Islam Negeri Sultan Syarif Kasim Riau, Indonesia.

Corresponding email: darto2@uin-suska.ac.id

Abstract. Teaching and learning mathematics have predisposition to be conducted mechanically. Teacher prefers to teach algorithm directly, give examples, and then ask the students to finish the tasks similar to those illustrated by the teacher. The students solve a mathematical problem by memorizing without understanding. As a result, the students only master the simple mathematics concepts, but very weak in communication mathematics. This condition can be solved by implementing Realistic Mathematics Education (RME) approach. In the RME approach, there is no special teaching methods required, but from a risen variety of characteristics. This research concludes the learning approach Realistic Mathematics Education (RME) loaded with math activities (doing mathematics), investigation, discussion, and reflection. The research's subject was 25 students at grade 6 SD Negeri 1 Kecamatan Bunga Raya Kabupaten Siak Riau, Indonesia. Data were collected through observations, interviews, checklist, and analyzing the students' works. Learning Realistic Mathematics Education (RME) is not a teacher explaining, giving examples, and then the students imitate the example of the teacher, but requiring students to work in groups, investigate, experiment, discuss and share. Realistic Mathematics Education (RME) approach contributes not only to the cognitive development of students but also the affective and psychomotor of students.

1. Introduction

Mathematical communication skills of students are so indispensable in solving math problems. It is critical not only on the results but also the process in obtaining answers and explaining about what students do in answering questions. Gravemeijer [1] explained that if we want students to reinvent mathematics, it should be by doing mathematics, teachers have to adapt on how their students construct the reason and help them build on their own thinking. Thus, learning mathematics can be very meaningful in the students' daily lives. Students' mathematical communication skills are mostly limited to short verbal answers given from a teacher, and symbolic questions with written exercises. However, students do not understand the process in getting answers on the aspects of mathematical communication skills. This can affect students' communication skills in learning mathematics.

Communication Mathematics plays a central role in the professional teaching standards because teaching is communicating [2]. The function of language in mathematics is to develop ideas in which language acts as a representation of meaning and the meaning of communication. By adopting that principle, students need to get used to communicate with others about information based on the interpretation, meanwhile others can rate and provide feedback on their interpretation. Those activities will give students a greater understanding of what



they have performed. In addition, teachers need to encourage students' ability to communicate at every lesson [3].

We also often hear expression as a formal language of mathematics. If the learning of mathematics only focused on memorizing terms rather than communicating ideas, the students with difficulties need to be introduced early in the learning process. They need to identify particular aspects of mathematical communication. Students are engaged to provide explanations and ideas in answering math problems so that their answers of comprehension questions can be meaningful.

Creating mathematics conditions are paramount for students to learn the skills of mathematics communication. Here, I discussed the approach of Realistic Mathematics Education. Learning the Realistic Mathematics Education (RME) approach will help students to expedite their understanding, solve problems by using their informal knowledge, provide opportunities for students to show their ability and to motivate students to solve problems of mathematics communication skills.

Communication mathematics is a way of sharing ideas, clarifying understanding, and communicating ideas through reflection, revision, and modification. When one student gets information in the form of a mathematical concept derived from the teacher or reading, there is mathematical transformation occurs from a source of information to the students [4]. Then, the students will respond based on interpretation of the information. The problem that often arises is the response given by students in which the information received does not match with the expectation. This may occur because of the characteristics of the mathematics that the students can complete the math problems well, but they do not understand what they have done.

Modestly, learning mathematics in the realistic mathematics education is like an iceberg phenomenon. The peak of the iceberg appears on the sea surface and needs a solid buffer. It means students can master the concepts and principles of abstract and deductive mathematics. It is a necessity to equip students with a variety of experiences related to their reality. Those learning experiences will act as a buffer, and it brings students to the summit of the iceberg.

Several studies have shown that several states-based math learning realistic mathematics education has the following benefits: mathematics is more interesting, relevant and meaningful, not too formal and not too abstract, consider the student's ability level, emphasize learning mathematics in learning by doing, facilitating problem resolution without the use of a standard resolution, and use context as a starting point for learning mathematics. Realistic Mathematics Education (RME) assess the teaching material will be taught to the students along with rationale (why the material should be taught), how students learn mathematics, how mathematics topics should be taught, as well as how to assess students' progress. Referring to the field of study, especially those related to instructional design, [5] three key principles in the realistic mathematics education:

1. Guided Reinvention

Through mathematical topics presented, students should be given the opportunity to undergo the same process to the process how the mathematician discovers mathematical concepts. This is conducted by entering the history of mathematics and providing contextual issues that have a range of solutions (about divergent), followed by the same mathematical solving procedures, and the design of the route as showed so that students learn to find their own concepts or results.

2. Didactical Phenomenology

In realistic mathematics education, these topics should be taught by associating mathematics with everyday phenomena. These topics are selected for two reasons: (1) application, and (2) contribution to the development of advanced mathematics. In learning mathematics, students are assigned math problems related to students' daily lives, and then they are asked to solve the problem in their own way. With designed teaching, the students find their own concepts learned with the guidance of teachers.

3. Emerging Models

Through the realistic mathematics education learning approach, students can develop their own models by solving contextual problems. At first, students use an informal solving model. After the interaction and discussion in class, one student proposes a solution that will develop into a formal model [6]. To discover the solution, the students may consider the history of mathematics to investigate how meaning and symbols emerged [7].

Learning mathematics through realistic mathematics education approach is so important to be applied in learning mathematics. This has implications for better mathematical communication skills. In this millennial era, students need to involve expressing their ideas and opinions related to learning mathematics. Mathematical communication in learning mathematics can be traced through writing, discussing, reading tables and graphs, explaining answers to the students' own language and linking to the context of students' daily lives.

Learning mathematics with realistic mathematics education approach includes several aspects. Teacher starts the lesson by asking the actual problem for students in accordance with their experience and level of knowledge. Significantly students are immediately engaged in the lesson [8]. Teacher must direct the problems based on the objectives of the lesson. Students develop or create symbolic models informally to the question posed. Teaching takes place interactively; students explain and give reasons for their answer, understand the answer, show agreement, express disapproval, look for other alternative solutions, and reflect on any measures taken or the result of lessons.

2. Method

The design of this research was a quasi-experimental research . This research uses two groups, namely experiment and control. The experimental group was taught using a Realistic Mathematics Education (RME) approach, while the control group was conventional learning. The population in this study are all students of

class VI A and VI B of SDN 1 Kecamatan Bunga Raya Kabupaten Siak. The technique to take the sample is random sampling method. The samples that selected is class VIA as experimental groups and classes VIB as control group. The following table illustrates the design of this study.

Table 1: Design of the study

Group	Pre-test	Treatment	Post-test
Experimental group	A1	X1	A2
Control group	A3	X2	A4

Table 1, A1 and A3 are pre-test for both groups where A1 pre-test for treatment group and A3 pre-test for the control group, while A2 and A4 represents the post-test for both groups in which A2 post-test for the treatment group and the A4 post-test for the control group. X1 represents the realistic mathematics education approach implemented in the treatment group while X2 represents the traditional approach and acted as a control group.

3. Result and Discussion

Realistic Mathematics Education (RME) based mathematics learning should be close to the life and experiences of students. On the one hand, this can help students understand the meaning and usefulness of mathematics. Students can develop their understanding of mathematics based on their informal knowledge. Context plays an important role as a link between the experience of mathematics with students. The context does not have to always be actual situations in everyday life, but can also be a fantasy situation. The most important issue is that students can place themselves in the context, and the context itself can be organized. In more detail, the Realistic Mathematics Education (RME) learning can be imagined, known, and has an interested situation, dealing with the world of students, organized, started with an informal knowledge of students, and not separated from solving problems, and required help to complete.

The next example (Figure 1) is a contextual problem of division and multiplication, the students must find the concepts of division.

Mr. Pasca has a rectangular-shaped chocolate bar, the chocolates are already divided into boxes. See the following picture. Then Mr. Pasca wants to distribute chocolate bar to four of her younger siblings. How much part of a chocolate bar does they get? Please explain your answer?



Figure 1. Sample of Contextual Problem

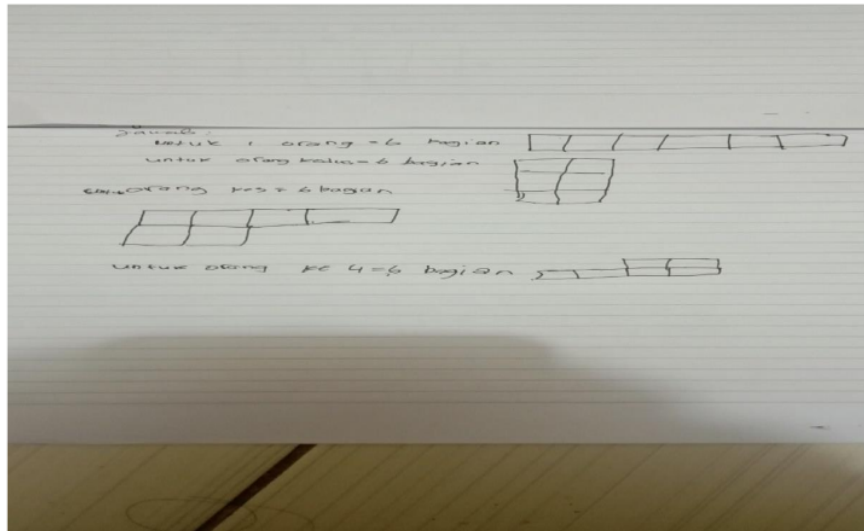


Figure 2. An example of a student's answer in finding the topic of division.

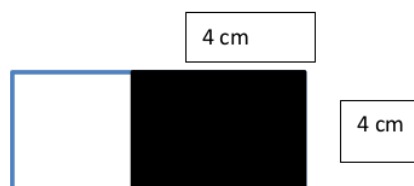
The students explained the distribution of chocolates to four of their younger siblings, then made a chocolate drawing pattern for each of his younger siblings into six bar, and each sibling's sections were different but showing the same six bar. An example of a student's answer can be seen in Figure 2.

Ms. Zeze bought a chocolate bar with the size shown in the image below, the price is Rp.12,000



Determine the price of each piece of a chocolate bar as shown in the black part of image below.

a.



The students explain how to determine the price of chocolate in the picture and to find the price of each for unit chocolate.

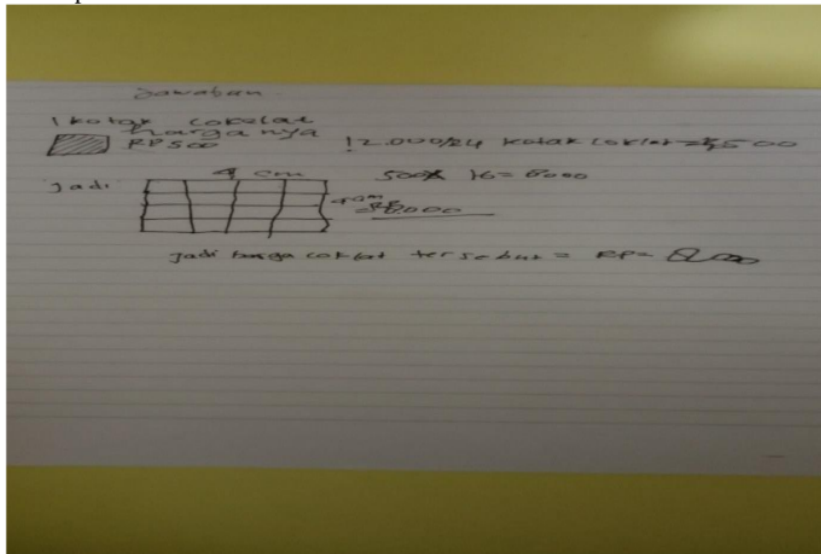


Figure 3. An example of a student's answer in finding division and multiplication.

Less than one half of the pupils at Grade VI answered this contextual problem correctly. Almost all of these pupils answered it by calculating the area of given piece chocolate: $6 \times 4 = 24$, then they divided 12.000 by 24 to get 500 as the price for one unit of chocolate. Next, the students calculate the area in the shaded image, it gets $4 \times 4 = 16$. To get the price of shaded chocolate $16 \times 500 = 8000$.

4. Conclusion

Realistic Mathematics Education (RME) approach requires no special teaching methods, but from a risen variety of characteristics. This research concludes that the learning approach, realistic mathematics education loaded with math activities (doing mathematics), investigation, discussion, and reflection. Learning realistic mathematics education is not a teacher explaining, giving examples, then the students imitate the example of the teacher, but requiring students to work in groups, investigate, experiment, discuss, and share. Realistic Mathematics Education (RME) approach not only gives great attention to the cognitive development of students but also to the affective and psychomotor of students. Learning the realistic mathematics education approach can help students to speed up their understanding, solve problems using their informal knowledge, provide opportunities for students to show their ability and to motivate students to solve problems related to students' mathematical communication skills.

References

- [1] A. Fauzan, A. Armiami, and C. Ceria, "A Learning Trajectory for Teaching Social Arithmetic Using RME Approach," *IOP Conf. Ser. Mater. Sci. Eng.*, vol. 335, no. 1, 2018.
- [2] E. Zakaria and M. Syamaun, "The Effect of Realistic Mathematics Education Approach on Students' Achievement and Attitudes towards Mathematics," *Math. Educ. Trends Res.*, vol. 2017, no. 1, pp. 32–40, 2017.
- [3] C. K. Ekowati, M. Ardi, M. Darwis, H. M. D. Pua, S. Tahmir, and G. D. Dirawan, "The Application of Realistic Mathematics Education Approach in Teaching Mathematics in Penfui Kupang," *Int. J. Educ. Inf. Stud.*, vol. 5, no. 1, pp. 35–43, 2015.
- [4] K. Sinjai, "Improving Mathematics Communication Capabilities through Direct Teaching Models with Problem Posing Approaches 1," vol. 7, no. 1, pp. 16–27, 2019.
- [5] R. N. Yolanda, U. N. Padang, M. Lecture, and U. N. Padang, "Development of Local Instructional Theory Topic Division Based on Realistic Mathematics Education," vol. 1, no. 2, pp. 242–256, 2019.
- [6] R. M. Education, *International Reflections on the Netherlands Didactics of Mathematics Visions on and Experiences with*. .
- [7] "Design-Based Research and Local Instruction," pp. 84–93, 2018.
- [8] K. Gravemeijer and M. Doorman, "Context problems in realistic mathematics education: a calculus course as an example," 1999.

The effect of learning realistic mathematics education (RME) Approach to improve students' mathematical communication

ORIGINALITY REPORT

33%

SIMILARITY INDEX

26%

INTERNET SOURCES

8%

PUBLICATIONS

13%

STUDENT PAPERS

MATCH ALL SOURCES (ONLY SELECTED SOURCE PRINTED)

6%

★ Submitted to Far Eastern University

Student Paper

Exclude quotes On

Exclude matches < 4 words

Exclude bibliography On