Literature Review: Analysis of The Use of Realistic Mathematics Education (RME) On The Problem-Solving Ability of Students in Elementary Schools

Ferlia Putri Rahmania[1]✉, Turmudi[2]
[1,2,3] Indonesia University of Education, Elementary Education Program, Bandung, Indonesia
✉ ferliaputri5@gmail.com

Abstract. Innovation in learning is one of the efforts that can be made by educators to achieve the expected learning outcomes. This study aims to analyze, describe and discuss the use of Realistic Mathematics Education (RME) on students' problem-solving abilities in elementary schools. The method used in this research is SLR (Systematic Literature Review). This research uses sheet analysis of articles as a research instrument. The first step taken was to collect related articles published in the 2019-2021 period with sources from Google Scholar, sort the data, analyze the articles, summarize the discussion, and make conclusions. The articles used in this study were seven journal articles. The results of the study found that the use of RME in learning activities had a positive impact on the problem-solving abilities of elementary school students. This can happen because RME essentially means three things: (1) the real context in everyday life; (2) formal mathematical context in mathematics; or (3) an imaginary context that the mind can imagine.

Keywords: RME, Problem-Solving Ability

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INTRODUCTION

Mathematics is one of the subjects taught in formal educational institutions, including elementary schools. Susanto (2016: 185) argues that mathematics is a scientific discipline that can improve the ability to think and argue, contribute to solving everyday problems and in the world of work, and provide support in the development of science and technology. In line with this opinion, Johnson and Myklebust (1967) argued that mathematics is a symbolic language whose practical function is to express quantitative and spatial relationships while its theoretical function is to facilitate thinking (Abdurrahman, 2012: 202). So mathematics is a very important subject to be taught with the aim of creating quality human resources. Therefore, special attention is needed in the learning process.

Learning mathematics in elementary school is the first step to form students' mathematical concepts. Ideal mathematics learning and in accordance with the level of student development is expected to exist in order to achieve the objectives of learning mathematics. Elementary school students are in the age of cognitive development, their thinking patterns are still in the concrete operational stage. Even some elementary school students who are in lower grades are still at the pre-concrete stage. Elementary school children are in the pre-concrete stage when in learning it is difficult to understand the calculation operating system, such as addition, subtraction, multiplication and division. Learning mathematics which is abstract in nature, in the learning process teachers need tools in the form of learning media to simplify and clarify the message to be conveyed. When students understand a concept, the teacher must provide reinforcement so that the concept understood can be remembered for a long time.

Students need to learn mathematics starting from elementary school because it can affect students' abilities, including students being able to think and be able to solve problems in everyday life. So that with the existence of mathematical problem-solving exercises it is expected that students can be critical, and creative and train their reasoning in deciding to solve mathematical problems in everyday life. To be able to solve a problem-solving problem, we need to understand the problem by writing down the mathematical model of the problem, planning how to solve it, then implementing the solution, when it is finished, a check is needed so that we can be even more sure about the solution we are working on. Sudirman, et al (1991) stated that

problem-solving is a way of presenting lesson material by making the problem a starting point for discussion to be analyzed and synthesized to find solutions or answers by students (Priansa, 2017: 227). Then Polya (1985) defines problem-solving as an attempt to find a way out of a difficulty to achieve a goal that cannot be achieved immediately (Roebyanto and Harmini, 2017:15). In line with the opinion above, Susanto (2016: 197) states that solving mathematical problems can help understand information better, thus that problem solving is a process of overcoming difficulties encountered to achieve a goal to be achieved. Furthermore, quoting from the opinion of Polya (Amir, 2015), there are several indicators of the ability to solve mathematical problems, namely: a) understanding a problem, b) planning how to solve the problem, c) solving the problem according to plan and d) re-examining the results obtained. has been obtained in solving the problem by writing the conclusion of the answer.

Low learning outcomes in mathematics are a problem that often occurs in the world of education, especially in elementary schools. In mathematics, there are lots of formulas that must be memorized and most teachers only give formulas but do not explain the origins of the formulas, in the end, students do not master the concept and when given questions in the form of problem-solving students cannot solve them. As stated in previous studies by previous researchers. Among them, research conducted by (Rini & Hidayat, 2021) revealed that problems occur due to a lack of habit of giving non-routine problems to students. One of them lies in the way students solve questions in the form of problem-solving. Students experience difficulties in understanding problems, getting solutions, and presenting them in mathematical sentences related to problem-solving story questions so that what is asked becomes irrelevant to what has been planned.

Similar research was also carried out by (Sulastri, Rumisah, & Ismunandar, 2021) which stated that the causes of difficulties in solving mathematical problems include teachers not involving students in the learning process, lack of learning models that are capable of being a stimulus in developing mathematical problem-solving skills in motivating students to express their ideas and opinions, the lack of students' understanding of the material taught by the teacher because the learning presented by the teacher still uses direct learning which is less interesting and the teacher's lack of creativity in utilizing learning media and even students are still reluctant to ask the teacher if they haven't understood the material presented by the teacher. In this regard, it can also be proven from the world education ranking survey data that has been conducted by the OECD (Organization for Economic Cooperation and Development) through the PISA (Program for International Student Assessment) test, it is known that Indonesia ranks low in the field of mathematics on an international scale and also reinforced by the opinion of Sarnapi (2016), that the latest data in 2015 Indonesia was ranked 69 out of a total of 76 countries.

Referring to the series of problems above, students' problem-solving abilities need to find solutions so that these problems can be resolved. One effort that can be done is to apply Realistic Mathematics Education (RME). Realistic Mathematics Education (RME) is a learning theory in mathematics education. Realistic Mathematics Education (RME) is a learning theory in mathematics education. This RME theory refers to Freundenthal's opinion (Shoimin, 2014) also says that RME in its concept of use is the use of facts and reality experienced by students and understanding them as a whole aimed at achieving learning objectives smoothly and mathematics must be close to students' lives.

RME learning is an approach to learning mathematics that consists of a process of solving problems and managing the subject matter (Susilowati, 2018). One of the advantages of using RME is that it gives students a clear definition of how to solve problems in various ways. Students will get the right answer because they use different solutions and compare answers with others (Farida Soraya, Yurniwati, 2018).

The purpose of this study is to analyze, describe and discuss the development of students' problem-solving skills using Realistic Mathematics Education (RME) in learning in elementary schools.

METHOD

This study uses the *SLR (Systematic Literature Review)* method. This study analyzes, discusses, and describes literature review data from scientific articles obtained using online search engines. The literature review is a research method that is carried out through a literature review by searching and reading books, journals, and articles that are appropriate to the subject matter to obtain scientific writing (Marzali, 2016). This study uses an article sheet as a research instrument. The first step taken was to collect related articles published in the 2019-2021 period with sources from Google Scholar, sort the data, analyze the articles, summarize the discussion, and making conclusions. The articles used in this study were seven journal articles. The results obtained from the data collection activities will be analyzed with the steps above, then detailed in the research report.

RESULTS

Obtained data on students' problem-solving abilities using RME from several articles analyzed from the learning process in elementary schools. Articles in the form of research using experimental research methods.

Table 1. Students' Problem-Solving Ability

No	Name Of Researcher	Year	Results (Ability Troubleshooting)	Description
1	Elin Sapto Rini dan Kurnia Hidayati	2021	t_{count} = 7,073 > t_{table} = 1,684 using the t test	The use of RME makes students' problem-solving abilities better.
2	Fitri Sulastri, Runisah dan Denni Ismunandar	2021	t_{count} = 3,13 > t_{table} = 1,69 using the t test	The use of RME makes students' problem-solving abilities better.
3	Aam Amaliah	2020	t_{count} = 10,0707 > t_{table} = 2,0243 Using the t test	The use of RME makes students' problem-solving abilities better.
4	Dwi Rani Nur'aini, Yusuf Suryana dan Oyon Haki Pranata	2020	Posttest average = 79,06 > pretest average = 35,18	The use of RME makes students' problem-solving abilities better.
5	Tasya Amrina Rosyada, Yunita Sari dan Andarini Permata Cahyaningtyas	2019	t_{count} = 2,0912 > t_{table} = 2,0497 Using the t test	The use of RME makes students' problem-solving abilities better.
6	Winiarti Dwi Febriani, Geri Syahril Sidik dan Riza Fatimah Zahrah	2019	t_{count} = 4,6709 > t_{table} = 1,0341 Using the t test	The use of RME makes students' problem-solving abilities better.
7	Sri Kartika Asih	2019	t_{count} = 12,358 > t_{table} = 1,997 Using the t test	The use of RME makes students' problem-solving abilities better.

DISCUSSION

Learning with RME is learning which explains that what can be classified as these activities includes problem-solving activities, finding problems, and managing the subject matter (Susilowati, 2018). Realistic mathematics meant in this case is the term "realistic" which comes

from the Dutch term "zich REALISERen" which means "to imagine". Thus, the word "realistic" can mean: (1) the real context that exists in everyday life; (2) the formal mathematical context in the world of mathematics; or (3) an imaginary context that does not exist in reality but can be imagined. These three meanings are seen as the meaning of the term "realistic" as long as these contexts can be imagined in the minds of students who are studying mathematics (Freudenthal, 1991, Van den Heuvel-Panhuizen, 2003; Van den Heuvel-Panhuizen & Drijvers, 2014).

According to Van den Heuvel-Panhuizen and Drijvers (2014), there are six principles of learning mathematics using the PMR or RME approach, originally there were five principles outlined by Treffers (1987) and then refined into six principles including by Treffers himself. The six learning principles with the RME approach include the activity principle, the reality principle, the lever principle, the intertwinement principle, the interactivity principle, and the guiding principle.). As for its characteristics, RME uses "real world" contexts, models, student production and construction, interaction, and interrelatedness. Realistic mathematics learning begins with real problems, so students can apply previous experiences directly (Astuti, 2018). By learning realistic mathematics students can develop more complete concepts. Then students are also able to apply concepts to new fields and the real world. Realistic Mathematics Education (RME) syntax in (Rosmala, 2018) is 1) understanding conceptual problems 2) explaining conceptual problems 3) solving contextual problems 4) comparing and discussing answers 5) concluding.

The table above shows that the use of RME has a positive impact on improving elementary school students' problem-solving skills. This is by research that has been carried out by (Rosyada, Sari, & Cahyaningtyas, 2019) on the influence of the Realistic Mathematics Education (RME) learning model on the mathematical problem-solving abilities of fifth-grade elementary school students on the material volume of geometric cubes and blocks of mathematics. In this study it was explained that when the learning process occurs students play an active role in group discussions, and can be creative in finding solutions to solve the problems being posed, interacting with friends and teachers, and exchanging ideas, so that students can develop their insights and thinking power.

According (Asih, 2019) in his research regarding the effectiveness of the Realistic Mathematics Education (RME) learning model on mathematical problem-solving abilities. In practice, classes that have been treated with the RME model are better than those that have not been treated with RME, because during the learning process students are required to be more active in learning. The activeness of these students can be seen when students convey the results of their discussions in front of the class and when they express their opinions enthusiastically. This can be seen from the students' posttest scores being better than the pretest scores of students' problem-solving abilities when using the RME approach (Dwi Rani Nur'aini, Yusuf Suryana, 2020).

Students become active in learning based on research by Winarti et al. Students' problem-solving abilities increased significantly as evidenced by statistical calculations. Students feel challenged to solve problems because students are given the freedom to find their solutions. Students are free to explore themselves, all abilities will be contained, and will develop problem-solving skills. Skills will be honed because in learning students do things they like which cannot be separated from the learning context (Febriani Winarti Dwi, Geri Syahril Sidik, 2019).

RME is a learning approach that involves students directly. RME is student center or student-centered learning. The research conducted (Amaliah, 2020) explains that to overcome the problem of low problem-solving abilities that occur, teachers need a learning model that can improve problem-solving skills in mathematics. The learning model that can be applied to overcoming these problems is the Realistic Mathematical Education (RME) learning model. The main focus of the Realistic Mathematical Education (RME) learning model is the idea that is formed from the results of human activity and the process of mathematical reality. In (Sulastri, Rumisah, & Ismunandar, 2021) students completed mathematics learning with a success percentage of 83.8% of 37 students. Students' problem-solving ability is better than before. Students carry out systematic learning that starts from understanding contextual problems to solving problems.

The results of previous research indicate that RME has a good effect on increasing students' problem-solving abilities. Previous research is related to this research which both look

at how the problem solving abilities of elementary school students are. This RME provides an opportunity for students to prove themselves who have superior competence. Students respond to each problem by relating it to the reality of students' daily lives, then they seek and find solutions according to their respective concepts, of course with the direction of the teacher.

CONCLUSION

The problem-solving abilities of elementary school students get a positive impact from using RME in the learning process. Based on the literature review conducted, the researcher can conclude that to overcome problems related to problem-solving abilities, the best solution can be offered by using RME. RME makes students active in learning, students are free to explore their knowledge and grow the courage to try new things. The use of RME provides special competence for students, namely finding and understanding the concept of learning material in more depth, inseparable from the problem-solving abilities of students in elementary schools. This can happen because RME essentially means three things: (1) the real context in everyday life; (2) formal mathematical context in mathematics; or (3) an imaginary context that the mind can imagine.

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