jurnal ibriez | Jurnal Kependidikan Dasar Islam Berbasis Sains
Volume 7
Nomor 2
Tahun 2022

# MATHEMATICS PROBLEM-SOLVING ABILITY FOR FOURTH GRADE STUDENTS OF SDN 2 TONATAN BY USING THE PMRI APPROACH

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**Abstrak**

Pemecahan masalah merupakan salah satu kemampuan dasar matematika yang harus dikuasai siswa. Untuk mengembangkan kemampuan tersebut, pendidikan harus mengarahkan siswa kepada penggunaan berbagai situasi dan kesempatan dalam menemukan kembali matematika dengan cara mereka sendiri. Salah satu pendekatan yang bisa digunakan adalah Pendidikan Matematika Realistik Indonesia (PMRI). PMRI juga menekankan untuk membawa matematika pada pengajaran bermakna dengan mengaitkannya dalam kehidupan nyata sehari-hari yang bersifat realistik. Kesimpulan penelitian ini adalah 1) Kemampuan pemecahan masalah matematika siswa kelas IV SDN 2 Tonatan (kelas eksperimen sesudah menggunakan pendekatan PMRI) adalah sedang. 2) Kemampuan pemecahan masalah matematika siswa kelas IV SDN 2 Tonatan (kelas kontrol yang tidak menggunakan pendekatan PMRI) adalah sedang. 3) Terdapat perbedaan kemampuan pemecahan masalah matematika siswa kelas 4 SDN 2 Tonatan antara sebelum dan sesudah menggunakan pendekatan PMRI dengan $t_{hitung} > t_{tabel}$ atau 8,903 > 2,8 pada taraf signifikansi 5 % dan 2) Terdapat perbedaan kemampuan pemecahan masalah matematika siswa kelas 4 SDN 2 Tonatan antara yang menggunakan dan tidak menggunakan pendekatan PMRI dengan $t_{hitung} > t_{tabel}$ atau 2,79 > 2,02 pada taraf signifikansi 5 %.

**Kata Kunci**: pemecahan masalah, matematika, PMRI, realistik

***Abstract***

*Problem solving is one of the basic mathematical abilities that students must master. To develop these abilities, education must direct students towards the useof various situations and opportunities in rediscovering mathematics in their own way. One approach that can be used is the Indonesian Realistic Mathematics Education (PMRI). PMRI also emphasizes bringing mathematics to meaningful teaching by linking it to everyday life that is realistic. The conclusion of this research is 1) The ability to solve math problems of grade IV SDN 2 Tonatan students (the experimental class after using the PMRI approach) is moderate. 2)The ability to solve math problems of fourth grade students of SDN 2 Tonatan (control class that does not use the PMRI approach) is moderate. 3) There is a difference in the mathematical problem solving ability of grade 4 students of SDN2 Tonatan between before and after using the PMRI approach with tcount > ttable or8,903 > 2,8 at a significance level of 5 % and 2)There is a difference in the mathematical problem solving ability of grade 4 students of SDN 2 Tonatan between*

*those who use and do not use the PMRI approach with $t_{count} > t_{table}$ or 2,79 > 2,02 at a significance level of 5 %.*
***Keywords:*** *problem solving, mathematics, PMRI, realistic*

## A. INTRODUCTION

Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character, and skills needed by themselves, society, nation and state.[1] So that students can develop their potential well, a supportive atmosphere is needed in the learning process, one of which is in the mathematics learning process.

Mathematics is a compulsory curriculum for students from primary education to secondary education.[2] It is intended to equip students with the ability to think logically, analytically, systematically, critically, and creatively and also have the ability to work together. In order to make mathematics learning is more focused, the 2013 curriculum of Kemendikbud sets the objectives of learning mathematics, which are: 1) improve intellectual abilities, especially studet high-level abilities, 2) form students' ability to solve a problem systematically, 3) obtain high learning outcomes, 4) train students in communicating ideas, especially in writing scientific papers, and 5) develop student character.[3]

Based on the statement above, to achieve the objectives of learning mathematics, students must also master some basic mathematical abilities. One of the basic skills in learning mathematics is problem-solving ability. Mathematical problem solving is one of the basic mathematical skills that students must master. The importance of having these abilities is like Branca's statement quoted by Hendriana, which states that solving mathematical problems is one of the essential goals in learning mathematics, even the process of solving mathematical problems is the heart of mathematics.[4]

According to the National Council of Teachers of Mathematics 1989 cited by Sobel, problem-solving should be the main focus of the mathematics curriculum. The primary attention should be paid to 1) the activeness of student participation in constructing and applying ideas in mathematics, 2) problem solving as a teaching tool and goal, and 3) the use of various forms of teaching such as small group, individual inquiry, peer teaching, peer

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[1] Presiden RI, Undang-Undang Republik Indonesia Nomor 20 tahun 2003 tentang Sistem Pendidikan Nasional Bab I pasal 1 yang membahas tentang ketentuan umum (Jakarta, issued 2003).

[2] Presiden RI, Undang-Undang Republik Indonesia Nomor 20 tahun 2003 tentang Sistem Pendidikan Nasional Bab X pasal 37 yang membahas tentang kurikulum., issued 2003.

[3] Kurikulum 2013.

[4] Heris Hendriana and Utari Soemarmo, *Penilaian Pembelajaran Matematika* (Bandung: PT Refika Aditama, 2014), 9.

groups, whole-class discussions, project work, etc.[5] To develop these abilities, education must direct students to the use of various situations and opportunities to reinvent mathematics in their own way. One approach that can be used is the Indonesian Realistic Mathematics Education (PMRI).

Indonesian Realistic Mathematics Education, commonly referred to as Realistic Mathematics Education, is an adaptation of a foreign language, namely Realistic Mathematics Education (RME), introduced by the Freudenthal Institute, which Professor Hans Freudenthal founded in 1971 in the Netherlands.[6] Although PMRI is an adoption from the country of origin, it has been developed and adapted to the Indonesian context, so it is not just a copy of the RME. PMRI develops a polite, open and communicative theory of mathematics learning. PMRI also emphasizes bringing mathematics into meaningful teaching by connecting it to real everyday life. Furthermore, students can solve problems by directly using the concepts they already have to solve the problem. Through learning activities with the PMRI approach, students can develop mathematical problem-solving skills.[7]

Unfortunately, based on observations that took place from May 20 to 25, 2019, researchers saw many teachers in SDN 2 Tonatan have not implemented mathematics learning using problem-solving with the PMRI approach. Most teachers carry out the learning process using the lecture method, then students take notes, memorize formulas and are given practice questions. Students do these things without knowing the meaning of what they are doing.[8]

According to Piaget quoted by Hudojo, students at this age are in the concrete operational stage,[9] that is the stage whose logical thinking is based on the physical manipulation of objects. Analytical work can be done by being oriented to objects or events that the child directly experiences. It would be nice if learning mathematics were done using problem-solving with the PMRI approach.

The above phenomenon confirms that problem-solving skills with the PMRI approach are some of the factors that determine success in learning mathematics. For this reason, researchers are interested in researching the mathematical problem-solving abilities of

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[5] Max A Sobel and Evan M. Maletsky, *Mengajar Matematika: Sebuah Buku Sumber Alat Peraga, Aktiivitas Dan Srategi Untuk Guru Matematika SD, SMP, SMA (Terjemahan Suyono)* (Jakarta: Erlangga, 2022), 60.

[6] Sutarto Hadi, *Pendidikan Matematika Realistik Dan Implementasinya* (Banjarmasin: Tulip Banjarmasin, 2005), 7.

[7] Effie Efrida Muchlis, "Pengaruh Pendekatan Pendidikan Matematika Realistik Indonesia (PMRI) Terhadap Perkembangan Kemampuan Pemecahan Masalah Siswa Kelas II SD Kartika 1.10 Padang," *Exacta* 10, no. 2 (2012).

[8] Pengamatan pada proses pembelajaran matematika kelas IV A dan IV B di SDN 2 Tonatan pada tanggal 20–25 Mei 2019.

[9] Herman Hudojo, *Mengajar Belajar Matematika* (Jakarta: Departemen Pendidikan dan Kebudayaan, 1988), 46.

fourth-grade students at SDN 2 Tonatan between those who use and do not use the PMRI approach.

Based on the background above description, this study's objectives are: 1) To find out the differences in the mathematical problem-solving abilities of fourth-graders at SDN 2 Tonatan before and after using PMRI. 2) To find out the difference in the mathematical problem-solving ability of fourth-grade students of SDN 2 Tonatan between those who use and do not use the PMRI approach.

## LITERATURE REVIEW

### Ability to Solve the Problem in Mathematic

The problem in question here is a problem related to mathematics. In understanding mathematical problems, we usually ask ourselves several questions that help us to be able to select the information. Frequently asked questions are "what do you know?", "how much?", "what is it?", "who?", "what are you looking for?" etc. A problem is a question that must be answered or responded to. However, not all automatic questions will be a problem. A question will be a problem only if the question indicates a challenge that a routine procedure cannot solve that the perpetrator already knows.[10] A problem is relative because a question may be considered a problem by someone, but for others, the question is not a problem.

Problem-solving in mathematics learning can be defined as using various mathematical concepts, principles, and skills that have been or are being studied to solve non-routine problems.[11] Non-routine questions are questions that require further thought in their completion because the procedures are not the same as those learned in class. In other words, non-routine questions present new situations that have never been encountered by students before. Holmes states that whatever the problem, routine or non-routine, depends on the problem solver. A routine problem for class VI may become non-routine if it is given to class I students.[12]

To be skilled in solving problems, it's requires cognitive, affective, and psychomotor abilities. These three abilities are used simultaneously, cannot be represented by one or two aspects only, but must be integrated as a whole. For example, if we want to solve the problem of measuring the area of the space in the geometry, not only cognitive abilities are used, but also affective abilities. It is required to accept problems as challenges that must be solved and psychomotor abilities to carry out problem-solving in the form of actual actions.

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[10] Fajar Shadiq, *Pemecahan Masalah Penalaran Dan Komunikasi* (Yogyakarta: Departemen Pendidikan Nasional, 2004), 12.

[11] Nyimas Aisyah et al., *Pengembangan Pembelajaran Matematika SD* (Jakarta: Direktorat Jenderal Pendidikan Tinggi Departemen Pendidikan Nasional, 2007), 4.

[12] Emma E Holmes, *New Directions in Elementary School Mathematics-Interactive Teaching and Learning* (New Jersey: A Simon and Schuster Company, 1995), 36.

Polya, quoted by Suherman, said that the solution to problem-solving problems went through 4 steps: 1) understanding the problem, 2) planning for problem-solving, 3) carrying out problem-solving plans, and 4) looking back at the solution.[13] The four steps must be carried out sequentially. If students can do these four steps well, then students are considered to have been able to solve the problem.

Problem-solving taught in schools is usually a problem found in everyday life and poured into textbooks. Students often see the relationship between what is taught in school and what happens in the real world. Problem-solving taught in schools can reduce the gap between real-life math problems and math problems in class. Solving mathematical problems will encourage students to think creatively and positively about mathematics. Problem-solving can be used to see the relationship between ideas and between mathematics and other subjects.[14]

Problem-solving can be done if students have found high-level rules, where high-level rules require combining concepts obtained by students in the previous learning phase. When students already have problem-solving skills, they will be more skilled in selecting and identifying relevant conditions and concepts, seeking generalizations, formulating plans for completion, and organizing skills that have been previously possessed.[15]

**PMRI Approach**

The PMRI approach is in line with learning theories currently developing, such as constructivism and contextual learning, better known as contextual teaching and learning (CTL). The constructivist approach and CTL represent learning theory in general, while PMRI is a learning theory developed specifically for mathematics. The PMRI concept is in line with the need to improve mathematics education in Indonesia, which is dominated by the issue of how to increase students' understanding of mathematics and develop reasoning power.

According to Hans Freudenthal as quoted by Suherman, the PMRI approach is based on the assumption that "mathematics is a human activity", that is, mathematics is a human activity.[16] Mathematics as a human activity means that humans must be allowed to rediscover mathematical ideas and concepts with the guidance of others. In this case, students need guidance from teachers. So students cannot be seen as passive recipients of ready-made mathematics. Mathematics education should be directed at using various situations and opportunities that allow students to reinvent mathematics on their own.

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[13] Suherman, et al. *Strategi Pembelajaran Matematika Kontemporer* (Bandung: Jurusan Pendidikan Matematika UPI, 2001), 84..

[14] Idris Hatta, *Landasan Pendidikan* (Surakarta: Universitas Muhammadiyah Surakarta, 2001), 174.

[15]Lesta Lestari and Deddy Sofyan, "Perbandingan Kemampuan Pemecahan Masalah Siswa Dalam Matematika Antara Yang Mendapat Pembelajaran Matematika Realistik (PMR) Dengan Pembelajaran Konvensional (Penelitian Eksperimen Di Kelas VIII Sekolah Menengah Pertama Negeri Satu Sukawening)," *Jurnal Pendidikan Matematika* 3, no. 2 (2014).

[16] Suherman, *Strategi Pembelajaran Matematika Kontemporer*, 128.

According to Gravemeijer, quoted by Daitin Tarigan, the process of rediscovery takes place in four stages: first, the situational stage: situational and limited knowledge and strategies are used in the context of the situation at hand. Second, the referential stage: situational models and specific strategies used to explain the problem situation at hand. Third, the general stage: mathematical reasoning models and strategies are used to deal with various kinds of similar problem situations. Fourth, the formal stage: procedures and standard notations are used to solve mathematical problems.[17]

In general, PMRI is a learning theory that has been developed specifically for mathematics. The concept of realistic mathematics is in line with the need to improve mathematics education in Indonesia, which is dominated by the issue of how to increase students' understanding of mathematics and develop reasoning power. Based on the research conducted by Reykha, it is concluded that the students' mathematical problem solving ability after being applied the PMRI approach is better or more effective than before the PMRI approach was applied.[18]

This effort is carried out by exploring various situations and realistic problems. Realism in PMRI does not only refer to reality but also to something that students can imagine. This is in accordance with Afriansyah's statement, which states that the realism in PMRI is not required to be real/existent but can only be imagined.[19] Realistic mathematics uses realistic problems as a starting point for learning, so the problem situation needs to be contextualized or in accordance with students' experiences so that they can solve problems in informal ways through horizontal mathematization.

PMRI as a learning approach based on the real world has the following characteristics: a) learning starts from contextual problems taken from the real world, b) the abstract and real world must be bridged by models, c) students can use strategies, languages or symbols they themselves are in the process of mathematizing their world, d) the learning process must be interactive, and e) the relationship between parts in mathematics, with other disciplines and with problems from the real world is needed as an interrelated unit in problem solving.[20] So the implementation of the PMRI approach can make students more motivated in learning and they can understand a mathematical concept through concrete media without having to think abstractly. [21]

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[17] Daitin Tarigan, *Pembelajaran Matematika Realistik* (Jakarta: Departemen Pendidikan Nasional, Direktorat Jenderal Pendidikan Tinggi, 2006), 4.

[18] Reykha Nindya Komalig, Yesi Gusmania, and Asmaul Husna, "Efektivitas Pendekatan PMRI Terhadap Kemampuan Pemecahan Masalah Matematis Siswa Kelas X SMKIT Darussalam Boarding School," *Pythagoras* 8, no. 1 (2019).

[19] Ekayasa Aldila Afriansyah, "Makna Realistik Dalam RME Dan PMRI," *LEMMA* 2, no. 2 (2016).

[20] Aisyah et al., *Pengembangan Pembelajaran Matematika SD*, 18–19.

[21] Ni Putu Wulan Pratami Dewi and Gusti Ngurah Sastra Agustika, "Efektivitas Pembelajaran Matematika Melalui Pendekatan PMRI Terhadap Kompetensi Pengetahuan Matematika," *Jurnal Penelitian Dan Pengembangan Pendidikan* 4, no. 2 (2020).

According to Gravemeijer, cited by Supinah & Agus, there are three main principles in PMRI: guided reinvention, didactic phenomenology, and self-developed models. Guided reinvention means providing opportunities for students to perform mathematization with realistic contextual problems for students with the help of the teacher. Students are encouraged to be active and are expected to construct the knowledge they will acquire. Learning does not start from the properties or definitions, or theorems followed by examples. However, it starts with real problems, which then, through student activities, are expected to be able to find properties, definitions, theorems, or rules by the students themselves.

Didactic phenomena mean that mathematical topics are presented based on their application and contribution to the development of mathematics. Mathematics learning, which tends to provide information or tell students and use ready-made mathematics to solve problems, is changed by making problems the main means to start learning, thus enabling students to solve problems in their own way. In solving these problems, students are expected to be able to move towards horizontal mathematization and vertical mathematization. The achievement of horizontal mathematization is very possible through informal steps before arriving at more formal mathematics. In this case, students are expected to be able to solve problems in the direction of mathematical thinking so that they will find their own properties or definitions or certain mathematical theorems (horizontal mathematics), then improve their mathematical aspects (vertical mathematics).

The model is built by the students, meaning that when students work on real problems, students develop a model. This model is expected to be built by students themselves, either in the horizontal or vertical mathematization process. The freedom given to students to solve problems independently or in groups will allow the emergence of various student-made problem-solving models. Realistic mathematics learning is expected to have a sequence of "real situations → a model of that situation → a model towards formal → formal knowledge."[22]

According to Suwarsono, quoted by Murdani et al., there are several advantages of practical learning: 1) Realistic mathematics learning provides students with a clear and operational understanding of the relationship between mathematics and everyday life (real life) and its general use for humans. 2) Realistic mathematics learning provides students with a clear and operational understanding that mathematics is a field of study constructed and developed by students. 3) Realistic mathematics learning provides students a clear and operational understanding that the solution does not have to be in a single form. 4) Realistic

[22] Supinah and D W. Agus, *Strategi Pembelajaran Matematika Sekolah Dasar* (Jakarta: Departemen Pendidikan Nasional, Direktorat Jenderal Peningkatan Mutu Pendidik dan Tenaga Kependidikan, Pusat Pengembangan dan Pemberdayaan Pendidik dan Tenaga Kependidikan (PPPPTK) Matematika, 2009), 72–74.

mathematics learning prioritizes the process of finding solutions to mathematical problems.[23]

Still, according to Suwarsono, quoted by Murdani et al., besides having the advantages of practical learning, it also has drawbacks, namely: 1) Efforts to implement PMR require a fundamental change of view on various things that are not easy to practice, for example, students no longer study finished goods. However, students with their own activities construct mathematical concepts. 2) Solving contextual questions is not always easy; sometimes, it takes a variety of ways. 3) The teacher's efforts to encourage students to find various ways of solving it often experience obstacles. 4) The process of developing students' thinking skills through contextual questions, the horizontal and vertical mathematization process is not simple because it requires a careful thought process to rediscover certain mathematical concepts.[24]

## B. RESEARCH METHOD

This study uses a quantitative method with a quasi-experimental design, which is a development of a true experimental design that is difficult to implement.[25] This design uses a control group but cannot fully control external variables that affect the implementation of the experiment. Quasi-experimentation was used in this study because it involved a whole group of subjects in the experiment, naturally formed in the class rather than randomly assigned to the experimental treatment. This study will compare the mathematical problem-solving abilities of SDN 2 Tonatan students between before and after using the PMRI and also the mathematical problem-solving abilities between the experimental group using the PMRI approach and the control group not using the PMR approach.

This research was conducted at SDN 2 Tonatan, located at Jalan Sekar Putih No. 27 A Ponorogo. The research took place from 27 August to 24 September 2019. The population in this study were 52 students of class IV SDN 2 Tonatan who were divided into 2 classes of study groups. The sample was determined non-proportionately or according to the number of students in each class, namely 25 people for the experimental group using the PMRI approach and 23 people for the control group (should have been 27 people, but there were 2 students who did not enter the pre-test and 2 students who did not enter at the time of the post-test) who did not use the PMRI approach. The number of samples was taken based on Creswell's statement, which stated that the minimum sample size for experimental research was 15 subjects per group.[26]

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[23] Murdani, "Mengembangkan Perangkat Pembelajaran Matematika Dengan Pendekatan Realistik Untuk Meningkatkan Penalaran Geometri Spasial Siswa Di SMP Negeri Arun Lhokseumawe," *Jurnal Peluang* 1, no. 2 (2013).

[24] Murdani.

[25] Sugiyono, *Metode Penelitian Kuali Kuanti Dan R&D* (Bandung: Alfabeta, 2013), 114.

[26] John W Cresswel, "Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research (2nd Ed)," *NJ: Pearson Merrill Prentice Hall*, 2005, 156..

In this study, the instrument used was a written test for the Mathematics subject matter of Value Fractions for fourth-grade students at SDN 2 Tonatan Ponorogo. Data collection techniques carried out in this study were sourced from students, namely in the form of a problem-solving ability test in the field of mathematics in class IV students who came from the results of the pre-test and post-test of the experimental and control groups. Analysis of the data used is to calculate the mean, standard deviation, and t-test.

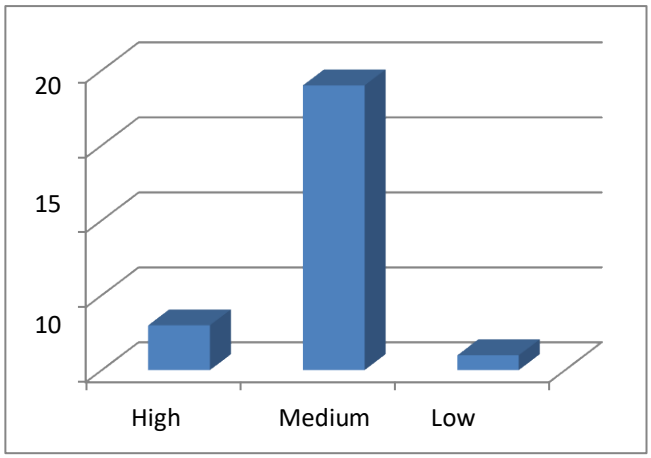
## C. DISCUSSION

### Mathematical Problem Solving Ability of Fourth Grade Students of SDN 2 Tonatan Using the PMRI Approach

**Table 1. Categorization of Mathematics Problem Solving Ability of Fourth Grade Students at SDN 2 Tonatan (Experimental Class After Using PMRI)**

| No. | Score | Categories | Frequency |
|---|---|---|---|
| 1. | > 84,138 | High | 3 |
| 2. | 63,602 – 84,138 | Medium | 18 |
| 3. | < 63,602 | Low | 4 |
| Total | | | 25 |

From the data in the table, it is known that the mathematical problem-solving abilities of fourth-grade SDN 2 Tonatan students for the experimental class after using the PMRI approach were in the high category of three people, and in the medium category, as many as 18 people and the low category with a total of 4 people. So, in general, it can be said that the mathematical problem-solving ability of SDN 2 Tonatan students for the experimental class after using the PMRI approach is moderate. From this data, when a graph is made, it looks like the following graph:



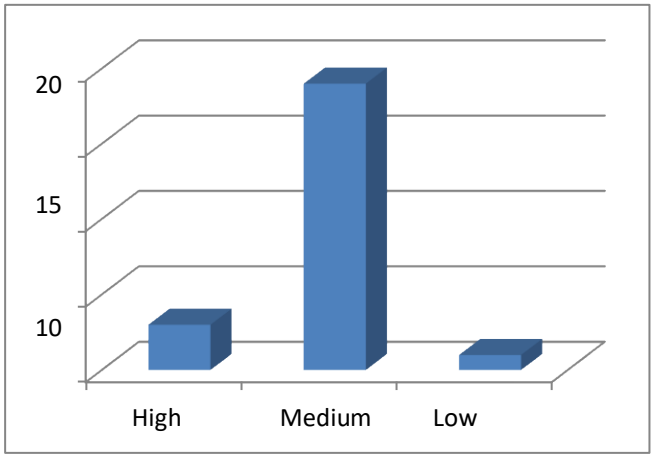

**Graph 1. Category of Mathematics Problem Solving Ability of Fourth Grade Students of SDN 2 Tonatan (Experimental Group After Using PMRI)**

**Mathematical Problem Solving Ability of Class IV Students of SDN 2 Tonatan who Don't Use the PMRI Approach**

**Table 2. Categorization of Mathematics Problem Solving Ability of Fourth Grade Students of SDN 2 Tonatan (Control Class Not Using PMRI)**

| No. | Score | Categories | Frequency |
|---|---|---|---|
| 1. | > 74,413 | High | 3 |
| 2. | 56,891 – 74,413 | Medium | 19 |
| 3. | < 56,891 | Low | 1 |
| Total | | | 23 |

From the data in the table, it is known that the mathematical problem-solving abilities of fourth-grade students of SDN 2 Tonatan (control class that does not use the PMRI approach) are in the high category as many as 3 people, in the medium category as many as 19 people and in the low category as many as 1 person. So in general, it can be said that the mathematical problem-solving ability of the students of SDN 2 Tonatan (the control class that does not use the PMRI approach) is moderate. From this data, when a graph is made, it looks like the following graph:




**Graph 2. Category of Mathematics Problem Solving Ability of Fourth Grade Students at SDN 2 Tonatan (Control Group Not Using PMRI)**

**Differences in Mathematics Problem Solving Ability of Fourth Grade Students of SDN 2 Tonatan between Before and After Using the PMRI Approach**

The t-test was conducted to determine whether there were differences in the mathematical problem-solving abilities of fourth-grade students at SDN 2 Tonatan in the experimental class before and after using the PMRI approach. The test is calculated based on data from the same 25 students. Based on the calculation of the different tests of mathematical problem-solving abilities of fourth-grade students of SDN 2 Tonatan between before and after using the PMRI approach to as many as 25 students, the t-test value was -8.903. Then look for the value of degrees of freedom with the formula db = n – 1 = 25 – 1 = 24. This value is then consulted with the t-value table at a significance level of 5%,

and the t-table value is 2.06. The test criteria are if $t_{-test} > t_{-table}$, then Ho is rejected, or Ha is accepted. It turns out that $t_{-test} > t_{-table}$ or 8.903 > 2.06 then Ho is rejected or Ha is accepted. The conclusion means that there are differences in the mathematical problem-solving abilities of fourth-grade students of SDN 2 Tonatan before and after using the PMRI approach. The results of the study are in accordance with Reykha's statement which states that the students' mathematical problem solving ability after being applied the PMRI approach is better or more effective than before the PMRI approach was applied.[27]

**Data Analysis of Differences in Mathematical Problem Solving Ability of Fourth Grade Students of SDN 2 Tonatan between those who use and do not use the PMRI Approach**

The t-test determined differences in the mathematical problem-solving abilities of fourth-graders at SDN 2 Tonatan between those who used and did not use the PMRI approach, which was calculated based on data from 48 students. The experimental class consisted of 25 people, and the control class consisted of 23 people. Based on the calculation of the different tests of math problem-solving ability of fourth-graders of SDN 2 Tonatan between those using the PMRI approach (as many as 25 students) and those not using the PMRI approach (as many as 23 students), the $t_{-test}$ value was 2,79. Then look for the value of degrees of freedom with the formula $db = n_1 + n_2 - 2 = 25 + 23 - 2 = 48 - 2 = 46$. This value was then consulted with the t-value table at a significance level of 5%, and the t-table value was 2,02. The test criteria are if $t_{-test} > t_{-table}$, then Ho is rejected, or Ha is accepted. It turns out that $t_{-test} > t_{-table}$ or 2,79 > 2,02, then Ho is rejected, or Ha is accepted. The conclusion means that there are differences in the mathematical problem-solving abilities of fourth-grade students of SDN 2 Tonatan between those who use and do not use the PMRI approach.

The results of the study are in accordance with Suwarsono, quoted by Murdani et al. statement which states that there are several advantages of practical learning of PMRI: 1) Realistic mathematics learning provides students with a clear and operational understanding of the relationship between mathematics and everyday life (real life) and its general use for humans. 2) Realistic mathematics learning provides students with a clear and operational understanding that mathematics is a field of study constructed and developed by students. 3) Realistic mathematics learning provides students a clear and operational understanding that the solution does not have to be in a single form. 4) Realistic mathematics learning prioritizes the process of finding solutions to mathematical problems.[28] So by using PMRI students can understand the relationship between mathematics and everyday life and its general use for humans, construct and develop

[27] Komalig, Gusmania, and Husna, "Efektivitas Pendekatan PMRI Terhadap Kemampuan Pemecahan Masalah Matematis Siswa Kelas X SMKIT Darussalam Boarding School."

[28] Murdani, "Mengembangkan Perangkat Pembelajaran Matematika Dengan Pendekatan Realistik Untuk Meningkatkan Penalaran Geometri Spasial Siswa Di SMP Negeri Arun Lhokseumawe."

operational understanding in mathematics, make many solutions from the same problem and they find the solution by their own way.

## D. CONCLUSION

Based on this research, conclusions can be drawn, namely: (1) The mathematical problem-solving ability of the fourth-grade students of SDN 2 Tonatan (experimental class after using the PMRI approach) is moderate. (2) The mathematical problem-solving ability of the fourth graders of SDN 2 Tonatan (the control class that does not use the PMRI approach) is moderate. (3) There is a difference in the mathematical problem-solving ability of fourth-grade students of SDN 2 Tonatan between before and after using the PMRI approach with t-test > t-table or 8.903 > 2.06 at a significance level of 5%. There is a difference in the mathematical problem-solving ability of fourth-grade students of SDN 2 Tonatan between those using and not using the PMRI approach with $t_{\text{-test}} > t_{\text{-table}}$ or 2.79 > 2.02 at a significance level of 5%.

## E. REFERENCES


Afriansyah, Ekayasa Aldila. "Makna Realistik Dalam RME Dan PMRI." *LEMMA* 2, no. 2 (2016).

Aisyah, Nyimas, Siti Hawa, Somakim, Purwoko, Yusuf Hartono, and Masrinawatie AS. *Pengembangan Pembelajaran Matematika SD*. Jakarta: Direktorat Jenderal Pendidikan Tinggi Departemen Pendidikan Nasional, 2007.

Cresswel, John W. "Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research (2nd Ed)." *NJ: Pearson Merrill Prentice Hall*, 2005.

Dewi, Ni Putu Wulan Pratami, and Gusti Ngurah Sastra Agustika. "Efektivitas Pembelajaran Matematika Melalui Pendekatan PMRI Terhadap Kompetensi Pengetahuan Matematika." *Jurnal Penelitian Dan Pengembangan Pendidikan* 4, no. 2 (2020).

Hadi, Sutarto. *Pendidikan Matematika Realistik Dan Implementasinya*. Banjarmasin: Tulip Banjarmasin, 2005.

Hatta, Idris. *Landasan Pendidikan*. Surakarta: Universitas Muhammadiyah Surakarta, 2001.

Hendriana, Heris, and Utari Soemarmo. *Penilaian Pembelajaran Matematika*. Bandung: PT Refika Aditama, 2014.

Holmes, Emma E. *New Directions in Elementary School Mathematics-Interactive Teaching and Learning*. New Jersey: A Simon and Schuster Company, 1995.

Hudojo, Herman. *Mengajar Belajar Matematika*. Jakarta: Departemen Pendidikan dan Kebudayaan, 1988.

Komalig, Reykha Nindya, Yesi Gusmania, and Asmaul Husna. "Efektivitas Pendekatan PMRI Terhadap Kemampuan Pemecahan Masalah Matematis Siswa Kelas X SMKIT Darussalam Boarding School." *Pythagoras* 8, no. 1 (2019).

Lestari, Lesta, and Deddy Sofyan. "Perbandingan Kemampuan Pemecahan Masalah Siswa Dalam Matematika Antara Yang Mendapat Pembelajaran Matematika Realistik (PMR) Dengan Pembelajaran Konvensional (Penelitian Eksperimen Di Kelas VIII Sekolah Menengah Pertama Negeri Satu Sukawening)." *Jurnal Pendidikan Matematika* 3, no. 2 (2014).

Muchlis, Effie Efrida. "Pengaruh Pendekatan Pendidikan Matematika Realistik Indonesia (PMRI) Terhadap Perkembangan Kemampuan Pemecahan Masalah Siswa Kelas II SD Kartika 1.10 Padang." *Exacta* 10, no. 2 (2012).

Murdani. "Mengembangkan Perangkat Pembelajaran Matematika Dengan Pendekatan Realistik Untuk Meningkatkan Penalaran Geometri Spasial Siswa Di SMP Negeri Arun Lhokseumawe." *Jurnal Peluang* 1, no. 2 (2013).

RI, Presiden. Undang-Undang Republik Indonesia Nomor 20 tahun 2003 tentang Sistem Pendidikan Nasional Bab I pasal 1 yang membahas tentang ketentuan umum. Jakarta, issued 2003.

———. Undang-Undang Republik Indonesia Nomor 20 tahun 2003 tentang Sistem Pendidikan Nasional Bab X pasal 37 yang membahas tentang kurikulum., issued 2003.

Shadiq, Fajar. *Pemecahan Masalah Penalaran Dan Komunikasi*. Yogyakarta: Departemen Pendidikan Nasional, 2004.

Sobel, Max A, and Evan M. Maletsky. *Mengajar Matematika: Sebuah Buku Sumber Alat Peraga, Aktiivitas Dan Srategi Untuk Guru Matematika SD, SMP, SMA (Terjemahan Suyono)*. Jakarta: Erlangga, 2022.

Sugiyono. *Metode Penelitian Kuali Kuanti Dan R&D*. Bandung: Alfabeta, 2013.

Suherman, et al. *Strategi Pembelajaran Matematika Kontemporer*. Bandung: Jurusan Pendidikan Matematika UPI, 2001.

Supinah, and D W. Agus. *Strategi Pembelajaran Matematika Sekolah Dasar*. Jakarta: Departemen Pendidikan Nasional, Direktorat Jenderal Peningkatan Mutu Pendidik dan Tenaga Kependidikan, Pusat Pengembangan dan Pemberdayaan Pendidik dan Tenaga Kependidikan (PPPPTK) Matematika, 2009.

Tarigan, Daitin. *Pembelajaran Matematika Realistik*. Jakarta: Departemen Pendidikan Nasional, Direktorat Jenderal Pendidikan Tinggi, 2006.