

Integration of Manipulative Media in Numeracy Learning in Madrasah Ibtidaiyah: Contribution to Islamic Basic Education

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Abstract: *Students' difficulties in understanding the concept of numeracy are often a challenge in learning mathematics at the primary education level, especially when the methods used are conventional and do not involve direct interaction. This study aims to explore the application of manipulative media as an innovative alternative in numeracy learning in 1st grade students of MI Ar-Rochmah Gesang Tempeh Lumajang. Manipulative media is expected to be able to present a more interesting and meaningful learning experience, so that students not only understand concepts in the abstract but also through physical involvement and active exploration. This research focuses on three main things: first, how the learning process of calculating with manipulative media is carried out in the classroom; second, the impact of the application of this media on the understanding of concepts and student learning outcomes; and third, the various challenges faced during the implementation of the method. These three aspects are the basis for understanding the effectiveness of manipulative media as well as evaluating the obstacles that need to be overcome to create more optimal learning. The research approach uses qualitative methods with case studies as the main design. Data collection techniques involve observation, interviews, and documentation, which aim to dig into the hands-on experiences of teachers and students. Data analysis was carried out through a thematic approach to identify patterns that emerge in learning interactions and their impact on students. The results of the study show that manipulative media is able to significantly increase student involvement in the learning process, create a pleasant atmosphere, and help students understand the concept of counting more easily. However, challenges such as time constraints and the need to improve teachers' competence in utilizing manipulative media were also identified. These findings offer new insights into the importance of innovation in mathematics learning, particularly in the Madrasah Ibtidaiyah environment, to support the achievement of better learning outcomes.*

Keywords: *Manipulative Media, Numeracy Learning, Islamic Elementary School (Madrasah Ibtidaiyah), Islamic Basic Education*

INTRODUCTION

This research is based on the challenges of effective mathematics teaching, especially at the elementary school level¹ such as MI Ar-Rochmah Gesang Tempeh Lumajang. One of the important things in developing effective mathematics learning is the selection and use of appropriate learning media. The learning media that is urgently needed is manipulative material.² Math objects are often abstract, which can cause students to find it difficult to understand. Therefore, teachers at MI Ar-Rochmah Gesang Tempeh Lumajang are expected to be able to use manipulative media, which is media that can be tampered with and manipulated, to help students understand mathematical concepts better.

The use of manipulative media in mathematics learning has a strong foundation in educational theory. Rahma Wati in Karija argues that manipulative media is an object that can be manipulated by teachers to convey mathematics learning so that students can easily understand the material being taught.³ Arifin also stated that manipulative media is media that can be reversed, shifted, cut, moved, added, drawn, grouped, or classified to explain learning materials related to mathematics.⁴ Thus, manipulative media can be concluded as a medium that can be tampered with to facilitate the delivery of mathematics learning and help students at MI Ar-Rochmah Gesang Tempeh Lumajang understand the subject matter better.⁵

In addition to the use of manipulative media, the right learning approach is also very important. The *Realistic Mathematics Education* (RME) approach is a mathematical learning model developed in the Netherlands since 1971 by a group of mathematicians from the Freudenthal Institute of Utrecht University. RME emphasizes the importance of starting learning by considering the student's realities and experiences.⁶ Zulkardi stated

¹ Novi Nurhayati and Rustanto Rahardi, "Students' Creative Thinking Ability in Developing Mathematics Learning Media During the Covid-19 Pandemic," *JPMI (Journal of Innovative Mathematics Learning)* 4, no. 2 (2021): 331–42.

² Rahmadina Dalimunthe et al., "The Utilization of Technological Development as a Learning Media in Schools," in *Proceedings of the National Seminar on Education FKIP University of Lampung*, 63–70.

³ James Russo et al., "Advancing Mathematics Learning in the Early Years," in *Research in Mathematics Education in Australasia 2020–2023* (Springer, 2024): 159–85.

⁴ Nadia Purnamasari, Ratnawati Ratnawati, and Yosi Yulizah, "The Influence of Liba (Beautiful, Clean, and Beautiful Environment) Media to Improve the Learning Outcomes of 1st Grade Students of SDN 115 Rejang Lebong" (Curup State Islamic Religious Institute, 2023).

⁵ Kristina Maseviciute et al., "The Study Was Led By," n.d.

⁶ Mila Rofiatul Ulya et al., "The Effectiveness of Flipped Classroom Learning with Indonesia's Realistic

that RME is a theory in mathematics education that emphasizes the idea that mathematics is a human activity and must be connected to the reality of students using a real-world context.⁷

The RME approach is a type of contextual learning that allows students to relate lessons in school to everyday life.⁸ Zulkardi emphasized that learning that uses a realistic approach must show the characteristics of realistic mathematics learning in terms of assessment, methods, materials, or objectives. RME, which literally translates as Realistic Mathematics Education (PMR), was first developed in the Netherlands in the 1970s by figures such as Freudenthal and Treffers.⁹ Van den Heuvel-Panhuizen in Wijaya explains that the word "realistic" comes from the Dutch "zich realiseren" which means "to imagine".¹⁰ Therefore, RME not only shows a connection to the real world, but also emphasizes on the use of situations that students can imagine at MI Ar-Rochmah Gesang Tempeh Lumajang.¹¹

Several experts also expressed their opinions on RME. Mastur Fauzi stated that RME places the reality and real experience of students in daily life as the starting point of learning and makes mathematics a student activity. Rahayu emphasized that RME is a mathematics learning approach that emphasizes reality and the environment as the starting point for learning. Hadi added that RME is used as a starting point for the development of mathematical ideas and concepts, which depart from a child's life that can be easily understood, real, and affordable by his imagination. Thus, the RME model can be concluded as learning that relates learning activities to real life and makes the students' experience the starting point of learning, which is relevant to the context and needs of students at MI Ar-Rochmah Gesang Tempeh Lumajang.

Mathematical Approach to Representation Ability Reviewed from Self-Efficacy," in *PRISMA, Proceedings of the National Seminar on Mathematics*, vol. 2, 116–23.

⁷ Rini Utami et al., "Editorial Board of Prosandika Unikal (Proceedings of the National Seminar on Mathematics Education of Pekalongan University) Reviewer," n.d.

⁸ Eddy Parapean, Tadius Tadius, and Weryanti Laen Langi, "Improving Mathematics Problem-Solving Skills through a Realistic Approach to Mathematics Education (RME) in Class VI of Makale 1 Christian Elementary School," *Journal of Innovation Research and Knowledge* 4, no. 10 (2025): 7661–72.

⁹ Mustapa, S. Pd *Exciting Math Classes With CRH, RME And TAI Learning Models* (Adab Publisher, 2024).

¹⁰ Listi Fitria Ramdan, "Implementation of the Realistic Mathematics Education (RME) Approach in Improving the Mathematical Literacy Ability of Junior High School Students," *El Banar: Journal of Education and Teaching* 7, no. 1 (2024): 10–23.

¹¹ Iasyah Fakhrary et al., "Improving Understanding of Geometry Concepts through a Realistic Mathematical Approach in Elementary Schools," *AR-RUMMAN: Journal of Education and Learning Evaluation* 1, no. 2 (2024): 770–77.

RESEARCH RESULTS AND DISCUSSION

One of the important aspects in developing mathematics learning, especially with the *Realistic Mathematics Education* (RME) approach, is the use of learning media. The learning media that is urgently needed is manipulative material. Abstract mathematical objects are often a source of difficulty for students, so the use of manipulative media is highly recommended.¹² Manipulative media are objects that can be tampered with and manipulated by students to visualize and understand these concepts. The use of manipulative media allows students to interact directly with physical representations of mathematical ideas, which helps build a stronger and more intuitive understanding.

Rahma Wati in Karija argues that manipulative media is a tool that can be manipulated by teachers in mathematics learning to make it easier for students to understand.¹³ In this view, teachers play an important role in selecting and directing the use of manipulative media to achieve learning goals. In line with that, Arifin defines manipulative media as media that can be reversed, shifted, cut, moved, added, drawn, grouped, or classified to explain mathematical material. This definition emphasizes the flexibility of manipulative media in presenting mathematical concepts through a variety of means, allowing students to explore concepts from a variety of perspectives. Thus, it can be concluded that manipulative media is a tool that allows students to interact directly with concrete representations of mathematical concepts, thus making it easier for them to understand. The use of manipulative media can also increase student engagement in learning, as they can actively participate in the process of discovery and construction of mathematical knowledge.¹⁴

Realistic Mathematics Education (RME) is a mathematical learning model developed in the Netherlands since 1971 by a group of mathematicians from the Freudenthal Institute of Utrecht University. This approach emerged in response to the traditional view of mathematics learning that tends to be abstract, formal, and teacher-centered. RME emphasizes the importance of connecting mathematics to the daily realities and

¹² Nur Wahyuni and Eva Nur Handayani, "Improving the Ability to Understand the Concept of Summing Numbers 1-10 through Number Cube Learning Media in Grade 1A Students of SD Negeri 104202 Bandar Setia," *Educational Catalysts: Journal of Education and Mathematics* 1, no. 4 (2024): 246–57.

¹³ Abdul Wahab et al., *Mathematics Learning Media* (Muhammad Zaini Publishing Foundation, 2021).

¹⁴ Gusti Ayu Mahayukti, I Gusti Ngurah Pujawan, and I Gede Margunayasa, "Activation of Concept Planting Teaching Aids for Optimizing Meaningful Mathematics Learning in Cluster I of Tembuku District," *Proceedings of the Undiksha Synagogue*, 2023, 271.

experiences of students. Alisa Lestari¹⁵ stated that RME is a model used in schools to teach mathematics based on the reality and experiences of students. This means that learning mathematics should start with problems that are real and relevant to students, so that they can see the usefulness of mathematics in their lives. In addition, Zulkardi said that *Realistic Mathematics Education* (RME) is a theory in mathematics education that was originally developed in the Netherlands. This theory emphasizes the idea that mathematics is a human activity and should be connected to real reality for students by using real-world contexts as a source of concept development and as an area of application, through the process of mathematization both horizontally and vertically. Mathematics here refers to the process by which students turn real-world problems into mathematical problems that they can solve, and then reflect those solutions in their original context.

RME is a contextual learning approach that allows students to relate lessons in school to everyday life. In this approach, students not only learn mathematical formulas and procedures mechanically, but also learn how to use mathematics as a tool to understand and interact with the world around them. Zulkardi emphasized that learning that uses a realistic approach must have distinctive characteristics in terms of assessment, methods, materials, and objectives. This means that every aspect of mathematics learning should be designed to reflect the principles of RME, including the use of contextual problems, an emphasis on student activities, and a focus on developing conceptual understanding.¹⁶

RME literally translates as Realistic Mathematics Education (PMR) is a mathematics teaching and learning approach. RME was first developed in the Netherlands in the 1970s. Freudenthal and Treffers were the figures who developed the RME. Initially, RME was implemented in the Netherlands and used as a model to improve mathematics learning, RME emerged as an alternative to traditional approaches that were considered less effective in developing students' mathematical understanding. Van den Heuvel Panhuizen in Wijaya further explains that the use of *the word "realistic"* actually comes from the Dutch word *"zich realiseren"* which means "to imagine". So, RME not only shows

¹⁵ Alisa Lestari, Rahmawati Patta, and Hardianto Rahman, "The Effect of the Use of Fractional Block Media on Students' Numeracy Ability in the Addition and Subtraction of Fractions in Class IV UPT SDN 18 Turatea," *Pendas: Scientific Journal of Basic Education* 10, no. 01 (2025): 824–32.

¹⁶ Siti Aminah Nababan, "Development of Learning Tools Based on the RMEU Approach to Improve the Critical Thinking Skills of Elementary School Students," *Bina Gogik: A Scientific Journal of Elementary School Teacher Education* 4, no. 2 (2023).

a connection with the real world but rather refers to the focus of realistic mathematics education, which is the emphasis on using situations that can be imagined by students. This means that the context used in learning does not always have to be a real situation, but it can also be a situation that students can imagine and understand.¹⁷ Here are some definitions of *Realistic Mathematics Education* (RME) learning from several sources:

- a. According to Mastur Fauzi, *Realistic Mathematics Education* (RME) places the reality and real experience of students in daily life as the starting point for learning and makes mathematics a student activity. Students are invited to think about how to solve problems they have experienced. In this case, students not only become passive recipients of information, but also become active actors in the learning process, where they are expected to ask questions, make guesses, and test their own ideas.
- b. According to Rahayu, *Realistic Mathematics Education* (RME) is a mathematics learning approach that emphasizes reality and the environment as the starting point of learning. This approach recognizes that students already have informal mathematics knowledge and experience that can be used as a basis for further learning. In other words, RME strives to build a bridge between students' informal knowledge and formal knowledge of mathematics.
- c. According to Hadi, *Realistic Mathematics Education* (RME) is used as a starting point for the development of mathematical ideas and concepts. It was further explained that this realistic mathematics learning departs from a child's life that can be easily understood by the child, real, and affordable by his imagination, and can be imagined so that it is easy for him to find possible solutions using the mathematical skills that he has possessed. This means that RME gives students the opportunity to use their own knowledge and skills to solve problems, rather than just following the procedures given by the teacher.¹⁸

Based on the explanation above, it can be concluded that the *Realistic Mathematics Education* (RME) model is a learning that in its learning activities is associated with real life and makes the student's experience as the starting point for learning. RME is a math learning approach that places math problems in everyday

¹⁷ Alif Via Sufianti and Srikandi Octaviani, "The Application of a Realistic Approach to Mathematics Education (RME) to Improve the Understanding of Mathematical Concepts of Grade IV Elementary School Students," *Indonesian Research Journal on Education* 2, no. 2 (2022): 889–95.

¹⁸ Cyntia Astika Siregar, "Development of Realistic Mathematics Education-Based Learning Media Assisted by Macromedia Flash 8 to Improve the Learning Outcomes of Grade XI High School Students" (Faculty of Teacher Training & Education, Islamic University of North Sumatra, 2024).

life so that it makes it easier for students to receive material and provide hands-on experience with their own experiences. RME focuses not only on the final outcome, but also on the process that students go through in discovering and understanding mathematical concepts, as well as on developing their ability to apply mathematics in new situations.

Table 1. Data on the Relationship of Manipulative Media and RME Methods

Aspects	Manipulative Media	RME Method	The Collaboration of the Two
Definition	Physical objects that students use to model mathematical concepts.	A learning approach that uses real situations as a starting point.	Combining concrete (manipulative) tools with contextual problems (RMEs) for a holistic learning experience.
Role	Turning abstract concepts into real.	Provide relevance and meaning to learning.	Helps students build understanding from concrete experiences to abstract thinking.
Benefit	Increase early engagement and understanding.	Cultivate critical thinking and problem-solving skills.	Creating interactive, meaningful, and student-centered learning that enhances understanding, participation, and independence.
Application Examples	Use a block to indicate a counting operation such as summation.	Have students calculate the total cost of groceries.	Use toy coins to count change from the grocery list they've counted.

Calculating skills are abilities that rely on reasoning logic and numbers.¹⁹ Numeracy skills are the ability that every child must have to develop their abilities.²⁰ The characteristics of their development can start from the surrounding environment,²¹ in line with the child's ability to increase at the stage of recognizing numbers related to addition and subtraction.²² Initial numeracy skills are the ability that every child must have to improve and develop their abilities.²³ The characteristics of its development can start from the surrounding environment, in line with that the development of children's abilities can develop to addition and

¹⁹ Mia Usniati, "Improving Mathematical Reasoning Skills Through Problem-Solving Approaches," 2022.

²⁰ Brian Butterworth, "The Development of Arithmetical Abilities," *Journal of Child Psychology and Psychiatry* 46, no. 1 (2023): 3–18.

²¹ J Tkemaladze, "Concept to the Living Space. Longevity Horizons," 2025.

²² Ridha Fadila Putri and Bety Liyaningrum, "Efforts to Improve Children's Numeracy Skills through Natural Material Media in Group B at Ta Balong Kindergarten," *Al-Affan Islamic Education Journal* 4, no. 2 (2024): 131–38.

²³ Yuting Liu, Peng Peng, and Xueye Yan, "Early Numeracy and Mathematics Development: A Longitudinal Meta-Analysis on the Predictive Nature of Early Numeracy.," *Journal of Educational Psychology*, 2025.

subtraction (Ratna Dewi).²⁴ Ratna Dewi in her research emphasized that early numeracy skills are an important foundation for children's future mathematical development.²⁵ Strong numeracy skills at the elementary level will enable students to succeed in learning more complex mathematical concepts later in life.^{26 27}

According to Nabila, numeracy skills are basic abilities that must be possessed by every child related to subtraction, addition, division, and multiplication.²⁸ This numeracy ability is very important to be developed as a provision for children in the future because this numeracy ability is needed in daily life.²⁹ Nabila also explained that the ability to calculate is not only about performing arithmetic operations mechanically, but also about understanding the concepts behind the operation and how to apply it in real-world situations.³⁰ It involves understanding how the numbers relate to each other, how they work, and how to use this knowledge to solve problems.³¹ According to Hartini, numeracy is a learning that introduces children to numbers, the form of numbers, and mentions the form of numbers. Hartini added that this introduction should be done gradually and by using methods that are interesting to children, such as games, songs, and other interactive activities.³²

So, from the opinions of the experts above, it can be concluded that the ability to count is an ability that every child must have related to subtraction, addition, division and multiplication. This calculating ability is learning that introduces numbers and the form of numbers. This calculating ability must be developed because it is needed in daily life. Good numeracy skills allow a person to manage finances, measure

²⁴ Via Karimatul Azaliya, "Affective Assessment in Islamic Religious Education at MI Al-Huda Ploso Nganjuk," in *Proceeding International Conference On Islam, Law, And Society*, vol. 4.

²⁵ Emily R Fyfe and Giulia A Borriello, "The (in) Effectiveness of Training Domain-general Skills to Support Early Math Knowledge," *Child Development Perspectives* 19, no. 1 (2025): 54–60.

²⁶ Putri and Liyaningrum, "Efforts to Improve Children's Numeracy Skills through Natural Material Media in Group B at Ta Balong Kindergarten."

²⁷ Ophélie Allyssa Desmet and Tarun Tejasvi Mutukuri, "Mapping Success: A Retrospective Study of Talent Development Trajectories in Chemical Engineering," *Gifted Child Quarterly*, 2025, 00169862241309346.

²⁸ Waode Herdas Kospian, Supriadi Supriadi, and Rahmawati Rahmawati, "Implementation Of The Independent Curriculum In Improving The Numeracy Of Grade IV Students," *ALENA: Journal of Elementary Education* 3, no. 1 (2025): 74–82.

²⁹ Linxi Lu, Marina Vasilyeva, and Elida V Laski, "Home Math Environment as a Mediator of Socioeconomic Differences in Early Math Skills: A Study of Chinese Families from Disparate Backgrounds.," *Developmental Psychology*, 2025.

³⁰ Lilis Marina Angraini, Sohibun Sohibun, and Arcat Arcat, "Computational Thinking Based on Interactive Multimedia" (Global Research And Consulting Institute (Global-RCI), 2022).

³¹ Junjie Wu et al., "Understanding LLMs' Fluid Intelligence Deficiency: An Analysis of the ARC Task," *ArXiv Preprint ArXiv:2502.07190*, 2025.

³² Aura Rifah Nabila et al., "The Utilization of Mathematics Online Education Games in Improving Students' Numeracy Skills," *Journal of Basic Education and Social Humanities* 2, no. 2 (2022): 355–62.

objects, understand statistics, and solve various practical problems. In addition, the ability to count also contributes to the development of logical and analytical thinking, which are important skills in various areas of life.³³

The objectives of developing numeracy skills in elementary school students, according to Susanti, are:

a. General purpose

In general, the purpose of numeracy skills for elementary school children is to know the basics of numeracy learning so that in the future children are better prepared to take part in mathematics learning, especially calculation materials at higher and more complex levels. In other words, the numeracy skills acquired in elementary school are a provision for success in learning mathematics in the future. It includes an understanding of concepts such as place values, arithmetic operations, and the relationships between numbers, which will be the basis for studying algebra, geometry, and other branches of mathematics.³⁴

b. Special purpose

Here are some specific goals of numeracy skills, namely:

1. Be able to think logically and systematically from a young age. This can be habituated through observation of real objects around them. This goal emphasizes the importance of developing mathematical thinking from an early age. Children need to be taught to observe patterns, make classifications, and draw logical conclusions based on their observations of the world around them.³⁵
2. Can involve and adjust children in social life which in their daily life requires the ability to calculate. It highlights the relevance of numeracy skills to social life and active participation in society. Good numeracy skills allow individuals to participate in economic activities, understand statistical information, and make informed decisions in a variety of social situations.³⁶

³³ Sahrunayanti Sahrunayanti, Magdalena Dema, and Wahyuningsih Wahyuningsih, "The Utilization of Congklak Game Media in Improving Students' Numeracy Skills," *Journal of Innovative Research* 3, no. 2 (2023): 433–46.

³⁴ Muslihatun Maulidian, Suci Karlina, and Muhamad Marzuki, "Strategies of Playing Number Sticks in Improving the Initial Numeracy Skills of Children Aged 5-6 Years," *AURA Education Journal (Raudhatul Atfhal)* 5, no. 2 (2024): 113–22.

³⁵ D R Hj Rofiatul Hosna, *Theory of Learning to Control the Society Era 5.0* (CV. Beta Aksara, 2025).

³⁶ Mary-Ann D Abbacan et al., "Exploring The Impact Of Educational Games On Numeracy Skill Development Among The Elementary Learners: A Systematic Review," 2025.

Having the help of the concept of space and time that can later be used to estimate the possible sequence of an event in the surrounding environment. Numeracy skills also help students understand the world around them and make rational predictions.³⁷ For example, an understanding of time and measurement allows students to plan daily activities, understand schedules, and estimate the duration of an event.

This study adopts a qualitative approach using a descriptive study method. A qualitative approach was chosen to allow for an in-depth understanding of the complexity of the phenomenon being studied. Descriptive studies in this context aim to provide a comprehensive and rich picture of the phenomenon or event that is the focus of the research.

In contrast to quantitative research that emphasizes the measurement and analysis of numerical data, this research focuses on the extraction of meaning and interpretation of non-numerical data.³⁸ The data analyzed can be in the form of interview transcripts, field notes, documents, images, and narratives relevant to the focus of the research. Through the collection and analysis of this qualitative data, this study seeks to understand holistically the important dimensions of the social phenomenon being studied.³⁹ Data are collected through observation and interviews to understand the perceptions, views, or experiences of individuals and groups regarding the issues being studied.⁴⁰ In this context, this study focuses on the effectiveness of using manipulative media through the RME approach to improve the numeracy skills of elementary/middle school students.⁴¹ This research will end with a conclusion based on the collected data. This conclusion is expected to provide a comprehensive understanding of how manipulative media and RME can affect students' mathematics learning.⁴²

This research was carried out at MI Ar-Rochmah Gesang Tempeh Lumajang, with the research subject of class I students with a total of 20 students, consisting of 9 male students and 11 female students. The selection of this location is based on certain considerations, such as accessibility or the specific characteristics of the student

³⁷ Aisyah N U R Azizah, "The Application of Ice Cream Stick Media in Developing Cognitive Abilities in Children Aged 4-5 Years at Dharma Bhakti Kindergarten, Petung Village, Bangsalsari District, Jember Regency," n.d.

³⁸ Mustapa, *Exciting Math Classes With CRH, RME And TAI Learning Models*.

³⁹ Navila Dwi Irmayani et al., "The Effectiveness of the Use of Manipulative Media through the RME Approach to Improve the Numeracy Ability of Elementary/MI Students" 2, no. 4 (2024).

⁴⁰ Faridatul Jannah, Halimatus Sadiyah, and Desi Endang Maisuri, "Components in Qualitative Research," *INTERDISCIPLINARY: Journal of Qualitative and Quantitative Research* 2, no. 2 (2025): 98-109.

⁴¹ Amelia Nur Oktaviani, "The Effect of the Realistic Mathematics Education (RME) Approach Assisted by PLSV Board on the Mathematical Literacy Ability of Junior High School Students" (Jakarta: FITK UIN Syarif Hidayatullah Jakarta).

⁴² Ratnah Kurniati et al., *Mathematics Education* (Tri Scientific Education Foundation, 2025).

population in the school. Research data was collected through observation and interview techniques. Observations are carried out to directly observe the teaching and learning process of students in the classroom. The researcher will record the interaction between teacher and student, the use of manipulative media, the student's response to learning, and the overall dynamics of the classroom. After observation, an interview was conducted with Mrs. Imas Nur Indah Rahmawati, homeroom teacher of class I, to strengthen the observation findings. This interview will provide additional insights into teachers' perspectives on the use of manipulative media, the challenges faced in learning mathematics, and their impact on students' numeracy skills. The data collected from observations and interviews are then analyzed and presented in the form of narratives. This analysis involves the process of organizing the data, identifying important themes, and interpreting the meaning contained in the data. Furthermore, conclusions are drawn based on the analysis of data that has been carried out since the beginning of the research. This conclusion will answer the research question and provide implications for educational practice.

Based on an interview with Mrs. Imas Nur Indah Rahmawati, S.Pd., the implementation of RME in class I has been implemented. Many teachers feel that the implementation of RME increases students' interest in learning. By relating math concepts to everyday situations, students can more easily understand the material and feel closer to what is being learned. They become more motivated and actively involved in the learning process.⁴³

However, some teachers consider that designing RME-based activities requires extra time and effort, especially in finding or creating contexts that are relevant and appropriate to the level of understanding of students at MI AR-ROCHMAH GESANG Tempeh Lumajang. This can be an obstacle for teachers who are not used to this approach. In addition, teachers often feel the need to get further training to understand the principles of RME in depth. Guidance from a coach or supervisor, or the opportunity to share best practices with fellow teachers, is also considered very helpful in overcoming these challenges. Then, in its implementation, some teachers feel that lesson time is often not enough, because RME-based activities take longer to delve into concepts. Teachers

⁴³ Wenjuan Zhang et al., "The Effect of Procrastination on Physical Exercise among College Students—The Chain Effect of Exercise Commitment and Action Control," *International Journal of Mental Health Promotion* 26, no. 8 (2024): 611–22, <https://doi.org/10.32604/ijmh.2024.052730>.

must set a strategy so that the material can be completed according to the existing time allocation.⁴⁴

From several challenges that researchers found, teachers have implemented RME learning in the classroom well, with the right steps in accordance with the implementation of PMR. These steps include understanding contextual problems, solving contextual problems, comparing and discussing answers, and drawing final conclusions. *Realistic Mathematics Education* (RME) is a learning approach that emphasizes the use of situations that students can see in their daily lives. This approach allows students to understand contextual problems, solve contextual problems, compare and discuss answers, and ultimately conclude. Thus, this method allows students to understand mathematical concepts or contextual problems that are indeed close to them.⁴⁵

Realistic Mathematics Education (RME) learning is expected to be able to improve the quality of learning which is also influenced by teacher performance. Learning will be successful and said to be effective if students are involved and actively participate in learning activities. The process of learning activities must involve all aspects of students' psychophysics, both physical and spiritual, so that the acceleration of behavioral change can occur quickly, precisely, easily, and correctly, both related to cognitive, affective, and psychomotor aspects. Using real-world problems, the RME model encourages students to reconstruct mathematical concepts based on their own experiences and thoughts. This allows students to build their own understanding of the concepts. The RME learning model has the potential to increase students' knowledge of how to manage materials used in daily life, as the materials provided to students are associated with the context of daily life. Students become more aware of the relevance of mathematics in their lives and are motivated to learn more.⁴⁶

He also said, "That grade I students cannot recognize numbers, cannot write numbers, so they are constrained in teaching addition and subtraction. Therefore, the RME approach by presenting manipulative media, one example is the use of marbles and abacco, is very helpful. In addition to the use of manipulative media such as marbles and

⁴⁴ Sembiring Isyos Sari, "Health Service Accessibility: Development of Health Promotion-Based Education Methods" (AA Rizky, 2025)2025.

⁴⁵ Nandita Nurlaelatul Hayani, Luvy Sylviana Zanthi, and Ika Wahyu Anita, "Optimizing Mathematical Communication Skills of Junior High School Students in Grade VII through the Realistic Mathematics Education (RME) Approach," *JPMI (Journal of Innovative Mathematics Learning)* 8, no. 1 (2025): 37–46.

⁴⁶ SEMA PRISKA BARUS, "DEVELOPMENT OF STUDENT WORKSHEETS THROUGH A REALISTIC MATHEMATIC EDUCATION MODEL IN GRADE III OF SD NEGERI 060938 KUALA BEKALA TP 2024/2025" (QUALITY UNIVERSITY, 2025)2025.

abacco, I also present videos related to everyday problems that are easy for students to understand and understand. I also apply it by having students take turns coming to the front of the class and practicing it directly, so that they will understand more easily the material I have explained."⁴⁷

So, from the results of the interview with Mrs. Imas Nur Indah Rahmawati, it can be concluded that the use of manipulative media through the RME approach is very effective in improving the numeracy skills of grade I STUDENTS MI AR-ROCHMAH GESANG TEMPEH LUMAJANG. Manipulative media helps students to build a more concrete understanding of mathematical concepts, which in turn improves their numeracy skills.

During observations and interviews, students showed very positive reactions to the use of manipulative media through the RME approach. Students look very interested and active in participating in learning when the material is delivered through objects that can be changed according to the student's wishes. Mrs. Imas Nur Indah Rahmawati revealed that students who are rarely active in class, even fairly quiet and quite slow to understand the material presented in the learning process, after the use of manipulative media is implemented, little by little it has shown significant development. Like students have started to be interested in trying, asking questions, and making their curiosity much more increasing. For example, they have often started to ask questions related to how the solution of the calculation problem can be solved if it uses manipulative media such as marbles, abacus, and other forms of manipulative media. Thus, manipulative media not only improves students' understanding, but also changes their attitude towards mathematics, from passive to active and curious.

Table 2. Data on Improving Mathematics Learning Through Manipulative Media and RME Methods

No.	Research Aspects	Description of Results	Evidence/Indicators
1.	Student Participation and Enthusiasm	There has been a drastic change from passive students to more active and enthusiastic in math lessons	The classroom atmosphere became more lively, students actively interacted with manipulative media (straws, ice cream sticks), and dared to discuss. Example: students directly use media to solve summation problems.
2.	Understanding Mathematical Concepts	There is an increase in understanding of basic concepts (addition and	An increase in average score on the final evaluation test. Students are able to explain their thought process when

⁴⁷ Zaliani Nur Meitiana, "Analysis of Learning Difficulties in Multiplication and Division Calculation Operations Through LKPD Class IV Elementary School," 2024.

		subtraction) which is stronger and not limited to memorization.	interviewed, demonstrating a deep understanding.
3.	Learning Independence	Students become more independent and confident in solving math problems.	Students experiment and find answers on their own with the help of manipulative media. Example: students use 7 straws to solve the "7-4" problem without relying on the teacher.

Mrs. Imas Nur Indah Rahmawati conveyed some of the difficulties felt when using or applying manipulative media through the RME approach, namely:

- a. Limited resources and limitations of manipulative media: Some schools do not have adequate access to the different types of manipulative media necessary for education. Physical props such as marbles, abacco, money, blocks, boards, and other manipulative tools can be expensive or difficult to come by. This makes it difficult for teachers to achieve optimal learning. In addition, the use of manipulative media requires more time and space to plan and execute learning. If facilities and infrastructure are limited, the implementation of the RME approach can be hampered. Therefore, it is important for schools and governments to provide adequate resources to support the use of manipulative media in math learning.⁴⁸
- b. Hard-to-learn design: Applying the RME approach can require a more sophisticated learning plan. Teachers must be able to create problems that are appropriate to the situation and use manipulative media in solving problems. This is not an easy task, as learning math requires the association of abstract concepts with real-life situations. Poor design can reduce the effectiveness of implementing this approach. One of the biggest challenges in RME is balancing real-world context with an understanding of abstract mathematical concepts.⁴⁹ Teachers must realize that manipulative media does not just function as a toy, but actually supports a deep understanding of mathematical concepts. As such, teachers need to have a deep

⁴⁸ Kharisma Hairunnisa, "Development of Realistic Mathematics Education-Based Digital Flipbook Teaching Materials to Facilitate Students' Mathematical Communication Skills" (Jakarta: FITK UIN SYARIF HIDAYATULLAH JAKARTA, 2023)2023.

⁴⁹ Dr. Tri Agustina, *CPA (Concrete Pictorial Abstract) and Realistic Mathematics Approach for Elementary School Students* (Maghza Library, 2024)2024.

understanding of how to effectively use manipulative media to facilitate student learning.

Difficulties in Managing Classes: Manipulative media-based learning often involves group activities, which means students interact with each other. Teachers must manage the classroom well to ensure that students stay focused on learning objectives and not be distracted by games or sounds that occur during activities. It can be difficult to control the dynamics of different groups. In addition, activities that use manipulative media usually require more time.⁵⁰ Compared to the more direct traditional way, the process of exploration and discussion can take longer. If not managed properly, this can cause learning to be less effective and result in delays in completing the material that must be studied. Therefore, teachers need effective classroom management skills to ensure that learning with manipulative media runs smoothly and efficiently.⁵¹

One of the main expectations of teachers is to improve students' understanding of mathematics through manipulative media. The main hope of teachers is that manipulative media can help students understand the material that has been given by the teacher. In addition, teachers also hope to increase student motivation and engagement. Manipulative media, which usually consists of games or practical activities, can make learning more interesting and enjoyable. This is expected to lower the fear or anxiety that students often experience towards mathematics, as well as encourage them to become more active and involved in the learning process. In this way, teachers hope to foster students' curiosity and desire to learn. Teachers also emphasize the importance of using manipulative media that is relevant and engaging to students.⁵²

Teachers also hope that there will be more adequate facilities, due to the lack of facilities and infrastructure such as LCD and electricity capacity so that teachers are not satisfied in using existing facilities. So, the teacher's hope is that electronic equipment can be realized soon. More broadly, teachers expect schools to have adequate facilities, such as comfortable classrooms, teaching aids, textbooks, and technological devices that

⁵⁰ Ahmad Mukhtamar et al., *CLASSROOM MANAGEMENT* (CV Rey Media Grafika, 2024)2024.

⁵¹ Echa Dwi Aprilia et al., "Teaching Profile of Mathematics Teachers on Classroom Management for Junior High School Students on Ranked Number Material," *Journal for Research in Mathematics Learning* 7, no. 2 (2024): 171–84.

⁵² Rizqi Bangun Rahmawati, Sekar Dwi Ardianti, and Wawan Shokib Rondli, "Mind Mapping-Type Cooperative Learning Model Assisted by Manipulative Media to Improve Students' Understanding of Concepts," *Journal of Educatio FKIP UNMA* 9, no. 2 (2023): 560–66.

support learning, such as physical aids for mathematics or technology-based learning software. The availability of adequate facilities will greatly support the effectiveness of the use of manipulative media and the RME approach in mathematics learning.⁵³

CONCLUSION

Research at MI Ar-Rochmah Lumajang shows that the use of manipulative media with the Realistic Mathematics Education (RME) approach has been proven to be effective in improving students' understanding, motivation, learning outcomes, and positive attitudes towards mathematics. This approach makes math more relevant and engaging because it relates lessons to real life as well as uses tools that are familiar to students, such as marbles or abacco. In the future, teachers are advised to continue to vary learning media and actively involve students so that the learning process is more meaningful and fun.

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⁵³ Mughni Azizzah, "Facilities and Infrastructure Management in Improving the Quality of Learning at Madrasah Aliyah Annajah Jakarta" (PTIQ Institute Jakarta, 2023)2023.

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