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Development of A Learning Model Based on RME for Improving Mathematical Literacy Skills and Students' Mathematical Disposition

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Abstract: This study aims to develop of a learning model based on Realistic Mathematics Education (RME) that are valid, practical, and effective to improve mathematical literacy skills and students' mathematical disposition. This study uses a research and development method with modified Plomp model. This research was carried out at SMP Negeri 9 Medan in the odd semester of the 2023/2024 academic year. The instruments in this study were the Mathematical Literacy Ability Test and the Mathematical Disposition Questionnaire. The data analysis technique in this study used descriptive statistical analysis. The results of this research showed that: (1) the RME-based learning model developed met the criteria for validity, practicality and effectiveness of the learning model; (2) increasing students' mathematical literacy skills using the realistic RME-based learning model developed in terms of the N-Gain in trial I of 0.29 with low criteria and in trial II of 0.59 with medium criteria. (3) increasing students' mathematical disposition abilities using the developed RME learning model in terms of the average in trial I and trial II, namely 5.04.

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Introduction

The development of a suitable learning model primarily focuses on creating conducive learning environments that encourage students to actively engage and enjoy the learning process. This approach aims to help students achieve the best possible learning outcomes and accomplishments (Darmadi., 2017). However, in reality, not all teachers are able to realize the expected goals in mathematics learning. The special reason that mathematics is an important science to study has many reasons, as stated and emphasized by Cockroft (Abdurrahman, 2017). Mathematics should be taught to students for several reasons. Firstly, it is a skill that is consistently used in everyday life. Secondly, all areas of study require a solid foundation in mathematics. Additionally, mathematics provides a concise and effective method of communication. It also offers the ability to present information in diverse ways. Furthermore, learning mathematics enhances logical thinking skills, accuracy, and spatial awareness. Lastly, it brings a sense of satisfaction when tackling complex problems.

Until now, mathematics teaching has only emphasized students' skills in working on mathematics problems. Mathematics as a science requires high levels of reasoning, understanding, understanding and application, so mathematics needs to be taught in a way that can lead students towards meaningful learning (Kardawati, S. Suparman., dan Astutik, 2020). The goal of mathematics subjects at primary and secondary school levels is to equip students with the skills to navigate life's changing circumstances in a constantly evolving world. This is achieved through the practice of logical, rational, critical, careful, honest, effective, and efficient thinking. When it comes to learning mathematics, problems are an

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integral part of the process. Unfortunately, many students struggle to see the practical applications of the knowledge they acquire. Difficulty understanding academic concepts and difficulty in connecting mathematical concepts is caused by a lack of mathematical literacy skills (Afrilianto, 2012).

Seeing the problems that exist In the realm of education, particularly in the domain of mathematics, it is imperative to strive for enhancements in the quality of mathematics education. One approach is to develop and enhance mathematical literacy skills. Being literate involves the capacity to comprehend information in a thoughtful, discerning, and introspective manner. This encompasses fostering the skills to recognize, ascertain, locate, assess, and generate ideas in an efficient and structured manner, as well as the aptitude to effectively communicate (Fatoni, 2018). Being literate goes beyond simply reading textbooks. It involves the student's capacity to analyze, critique, and reflect on various aspects of everyday life as a learning experience. Therefore, having strong literacy skills is crucial for connecting academic learning with real-world application (Amir, Z., Mulyani, 2019).

This survey, which is held every three years, takes a sample of 236 schools throughout Indonesia with student ages ranging from 15 years to 15 years 11 months. Most of the students who took part in the survey were in grade 9 (54.51%) and the rest were in grade 10 (45.49%). This occurs because Indonesia implements regulations that require children to start elementary school education at the age of 7 (Fathani, 2016). The results indicate that the level of mathematical literacy among students in Indonesia, as observed in international studies, remains unsatisfactory. However, low literacy is measured using test instruments that apply internationally and are not specifically adapted to Indonesian conditions. For example, there are questions that use stimuli about subways which are not familiar to Indonesian children (Anggraena., 2021). PISA uses many foreign contexts that are not yet familiar to students in remote areas, for example skateboarding, maglev trains, telephone systems in hotels and electronic cards.

Understanding and applying mathematical principles, concepts, and tools is essential for problem-solving, effective communication, and representing information in everyday situations. On the flip side, mathematical literacy also necessitates the ability to effectively communicate and elucidate the phenomena encountered using mathematical concepts (Sihombing, Nova A and Fauzi, 2017). Indeed, in our daily lives, students encounter challenges that span personal, community, work, and scientific realms. Many of these issues stem from the practical use of mathematics. A strong understanding of mathematics is essential for students to effectively solve these problems. It is important to consider the mathematical abilities required to solve problems in our daily lives. More specifically, I'm interested in exploring the mathematical competencies that 15-year-old children can acquire through school or specialized training. These competencies can greatly benefit them in their future careers or if they choose to pursue higher education at the university level. Thus, a strong grasp of mathematics is essential, as highlighted by the focus of PISA (Rahmah, 2016).

Having a strong grasp of mathematics is crucial as it enables students to effectively apply and understand mathematical concepts in different situations. This involves the application of mathematical reasoning, utilizing concepts, procedures, facts, and mathematical tools to effectively describe, explain, and predict various phenomena. This will assist individuals in understanding the significance of mathematics in everyday life and

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enable them to make well-reasoned and logical judgments and decisions (Sintawati, M, 2019).

When tackling problems, individuals with strong mathematical literacy skills possess a keen understanding of the mathematical concepts that are pertinent to the task at hand. Through this understanding, it progresses to the process of transforming the problem into a mathematical equation that can be solved. This process involves various activities that involve exploration, making connections, formulating ideas, making determinations, reasoning, and other cognitive processes (Wahyu Kuncara, A., Sujadi, 2019). This thought process can be divided into three primary processes: formulating, utilizing, and interpreting. This aligns with the overall objective of mathematics education in schools, which is to equip students with the skills to navigate the ever-changing world and adapt to new situations. It emphasizes the importance of logical, critical, careful, and honest thinking, as well as the ability to apply mathematical reasoning in everyday life and across different fields of study (Depdiknas, 2014).

Recognizing the significance of mathematical literacy skills, it is crucial to employ teaching methods that foster student engagement and practice in this area. Apart from mathematical literacy skills, learning mathematics also requires affective aspects as soft skills. (Afrilianto, M & Rosyana, 2014) mention mathematical soft skills as a component of the mathematical thinking process which is characterized by the affective behavior displayed by a person when implementing mathematical hard skills. One of the important affective abilities that students have is mathematical positioning ability.

Mathematical disposition according to NCTM (Sumarmo, 2016) means the tendency to think and act in a positive way. This is evident through the students' genuine curiosity and self-assurance in tackling mathematical concepts, their eagerness to consider different approaches, their determination to overcome mathematical challenges, and their inclination to introspect and analyze their own thought processes while learning mathematics. By nurturing a strong inclination towards mathematics, students will develop a fearless attitude towards learning and overcome the perception of its difficulty.

Challenges in grasping mathematics are viewed as a puzzle that can be resolved with the right approach. At the outset, students should possess a genuine curiosity for mathematics, with the guidance and support of their teacher, naturally. In addition, students will possess a strong desire to acquire knowledge in mathematics. They will approach the subject with confidence, taking on various challenges with a sense of responsibility and determination. They will never back down, but instead feel motivated by the difficulties they encounter. They will possess the ability to explore alternative approaches and critically analyze their thought processes (Dermawan, Fahmi, 2020).

Mathematical disposition abilities play a very important role in making mathematics learning run well (Ristanti, 2017a, 2017b). Even more than that, a mathematical disposition makes students enjoy learning mathematics, makes students benefit from and apply mathematics in everyday life. However, The reality observed in the field is that students' mathematical disposition abilities remain at a low level. From the observations conducted at SMP Negeri 9 Medan in class IX, it is evident that the majority of students in that class do not exhibit a strong interest in learning mathematics. However, there are a select few who display enthusiasm and a natural aptitude for the subject, specifically those who rank in the top 10 of the class. It is evident that students lack confidence when it comes to tackling mathematics problems. This is because many students perceive mathematics as a challenging subject and fail to recognize its practical applications in daily life. Students have yet to

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engage in critical self-reflection regarding their thinking processes and academic performance in the realm of mathematics. Furthermore, students have yet to grasp the practical applications of mathematics in their daily lives.

According to the findings from my observations and interviews with a mathematics teacher at SMP Negeri 9 Medan, it was found that a contributing factor to the students' low mathematical abilities was a lack of understanding of the concepts taught by the teacher. Additionally, the learning environment was described as monotonous. One can observe that the average outcomes of students' daily test scores in mathematics subjects do not all meet the minimum completeness criteria (KKM). Of the 37 students, only 14 students achieved the minimum completion score. From the results above we can see that students' mathematics learning outcomes are still low.

One of the causes of low student mathematics learning outcomes is the use of learning methods that are not appropriate to student needs. The approach used by teachers is still conventional (teacher center approach) (Lestari, 2022). In conventional learning, learning takes place in one direction without actively involving students. The role of students in conventional learning is to listen carefully and note down important points raised by the teacher. Students are often trapped in boring conditions because teachers do not bring students to a comfortable atmosphere for learning. This is because the teacher dominates the lesson so that students are not directly involved in participating in the teacher's explanation.

A learning approach that only uses information provided by the teacher has a negative impact on students and creates negative attitudes towards mathematics (Zayyadi, M., Nusantara, T., Subanji, S., Hidayanto, E., & Sulandra, 2019). Students see mathematics as a collection of rules and exercises that make them bored, bored, and not useful in their lives. Because students' activities only involve memorizing and repeating the same procedures, this results in low mathematics learning outcomes.

In order to enhance students' mathematical literacy skills and foster a positive attitude towards mathematics, it is essential to implement a learning model that aligns with the subject matter, learning objectives, student maturity level, situation, facilities, and teacher professional abilities. One educational approach that offers students the opportunity to independently tackle mathematical problems is the RME-based learning model. The realistic mathematics approach is a learning approach that focuses on using real-world problems as a basis for learning. By adopting a practical and logical approach, students are encouraged to actively engage in the development of their mathematical skills based on their individual abilities. This will result in more meaningful learning outcomes for students. The pragmatic mathematics approach is a learning approach that begins with tangible concepts for students, prioritizing practical skills, fostering discussion, collaboration, and debate among peers. This enables students to independently discover solutions to problems (Laurens, T., Batlolona, F. A., Batlolona, J. R., and Leasa, 2018).

A learning process that incorporates elements of constructive, interactive, and reflective approaches is known as realistic mathematics learning. This approach, known as Realistic Mathematics Education (RME), has been evolving in the Netherlands since the 1970s. The foundation of realistic mathematics learning is the perspective that mathematics is a product of human activity (Putu, I., Stahn, S., & Kuturan Singaraja, 2019). The models that arise from students' mathematical activities can foster engagement in the classroom, resulting in a deeper level of mathematical reasoning and meaningful learning collaboration. Realistic mathematics learning is a type of learning that actively engages students both physically and mentally, placing them at the center of the learning process. It also promotes a democratic

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approach to education. The Realistic Mathematics Approach incorporates various learning characteristics, such as utilizing context, models, student contributions, interactive formats, and intertwining (connections) between mathematical concepts and concepts from other subjects (Suryanto., 2017).

Considering the aforementioned, it is crucial to explore different options and creative solutions to enhance students' proficiency in mathematics and their attitudes towards the subject. Teachers must employ innovative methods to enhance learning, crafting engaging and effective models that inspire students to embrace the study of mathematics. Put simply, students will enthusiastically embrace the educational content. According to a study conducted by Saragih and Habeahan in 2014, the significance of creativity in creating learning resources cannot be overstated. It is crucial to design learning tools that align with the chosen learning models and strategies.

The learning process involves a dynamic exchange between students, teachers, and various learning materials within an educational setting. In order for the learning process to be carried out effectively and efficiently, it is important to have a well-structured plan, proper implementation, thorough assessment, and diligent supervision, as stated by Rusman (2012). Therefore, teachers should carefully strategize and plan their lessons to effectively facilitate the learning process. From the explanation provided, it can be inferred that the adoption and execution of an RME-based learning model is a proactive measure to enhance the efficacy and productivity of education. It is anticipated that this approach will enhance mathematical literacy and foster students' inclination towards mathematics.

The choice to develop this RME-based learning model stems from its focus on real-life and contextual problems. By immersing students in practical scenarios, they can gain a deeper understanding of the subject matter and apply mathematical concepts to solve everyday challenges. Thus, the implementation of an RME-based learning model is highly suitable for schools. The purpose of this study was to analyze the validity, practicality, behavior, and learning model based on RME developed in improving students' mathematical literacy skills and mathematical dispositions.

Research Method

The research conducted is focused on research and development. This research utilizes the Plomp development model and researchers will create an RME-based learning model, learning tools (Learning Implementation Plan, and Student Activity Sheet. Test your mathematical literacy with the Mathematical Literacy Ability Test Instrument, and gain insights into your mathematical disposition with the Mathematical Disposition Questionnaire. The development model used in this study is the learning development model proposed by (Plomp, 1997) which consists of five stages. The five stages include the initial investigation stage, product design stage, realization/construction stage, testing, evaluation, and revision stage, and implementation stage.

The participants in this study consisted of ninth-grade students from SMPN 9 Medan during the first semester of the 2023/2024 academic year. The implementation took place over the course of three meetings in class IX-4, focusing on quadratic functions. The research design employed was a one group pretest-posttest design. Prior to administering treatment, students are initially presented with pretest questions, followed by posttest questions at the conclusion of their learning experience (Sugiyono, 2018). This research design was employed to assess the growth of students' mathematical literacy skills and mathematical disposition

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following instruction with the RME-based learning model. You can find the validation results in table 1 below.

Table 1. Validation Results

No	Aspect	Average	Category
1	RME Learning Model	4,7	Valid
2	Learning Tool Plan	4,9	Valid
3	Student Worksheets	4,8	Valid
4	Literacy skills	4,0	Valid
5	Disposition	4,5	Valid

Table 1 shows that the RPP, RME Model, Student Worksheets have a total "valid" average of 4.5. The data in this study were analyzed using descriptive statistical analysis. According to Sheskin (2004), descriptive statistics as an analysis tool for the purpose of describing data without drawing conclusions and making predictions. Common procedures used in descriptive statistics are in the form of tables, graphs, diagrams and calculations on the size of the central and dispersion of data.

Results and Discussion

Data Analysis Results of the Effectiveness of the RME-Based Learning Model in Trial I

The effectiveness of the learning tools developed can be observed through various indicators. For instance, a significant majority of students, approximately 85%, achieved a minimum score of 75 in the mathematical literacy skills test. Additionally, around 75% of students successfully met all the learning objectives. Moreover, an impressive 80% of students expressed positive feedback regarding the learning tools that were created. Here, we will provide a detailed analysis of each indicator used to assess the efficacy of learning tools in trial I, focusing on a practical approach. This research examined the students' level of mastery by assessing their mathematical literacy abilities. The assessment was conducted using a mathematics literacy ability learning outcomes test that had been specifically designed for this purpose. Table 2 below displays the results of the students' mathematical literacy ability test in trial I.

Table 2. Description of Mathematical Literacy Ability Test Results in Trial I

Information	Mathematical Literacy Ability Learning Results Test
The highest score	84
Lowest Value	58
Average	71,46

According to Table 2, it is evident that the students' average mathematical literacy ability, as indicated by the results of the mathematical literacy ability test, is 71.84. In addition, Table 3 below displays the outcomes of the traditional assessment of students' mathematical literacy skills in trial I.

Table 3. Classical Completion of Students' Mathematical Literacy Abilities in Trial I

Category	Mathematical Literacy Ability	
	The number of students	Percentage
Complete	21	56,76%
Not Completed	16	43,24%
Amount	37	100%

According to the information in Table 3, it is evident that the students' learning completeness is determined by the results of the mathematical literacy skills learning outcomes test. Specifically, 21 out of 37 students (56.76%) completed the test, while 16 out of 37 students

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(43.24%) did not complete it. Based on the established standards for gauging student learning, a significant majority of students, approximately 85%, demonstrated their proficiency in mathematical literacy skills by achieving a minimum score of 75 on the learning outcomes test. Therefore, it can be inferred that the utilization of the learning tools developed, which were based on a realistic approach, fell short of meeting the requirements for attaining fullness in trial I.

Student Mathematical Disposition Ability Questionnaire Results in Trial I

In order to determine this capacity, researchers administered a questionnaire once the learning process had concluded. Table 4 below displays the outcomes of students' mathematical disposition abilities in trial I.

Table 4. Description of Mathematical Disposition Ability Results In Trial I

Max Score	Students' Mathematical Disposition Ability				
	X_{min}	X_{max}	$\overline{x}$	S	Average
160	109	154	121,68	3,81	82,21

According to Table 4, the data reveals that students possess a mean mathematical disposition ability of 82.21, accompanied by a standard deviation of 3.81. Looking at the level of mastery of students' mathematical disposition in the results of trial I, we can observe the data presented in Table 5 below.

Table 5. Level of Mastery of Students' Mathematical Disposition Ability in Trial I

No.	Value Interval	Mathematical Disposition Ability		Information
		The Number Of Students	Percentage	
1	KDM $\geq$ 125,48	26	70,27%	Tall
2	117,87 $\leq$ KDM < 125,48	9	24,32%	Currently
3	KDM < 117,87	2	5,40%	Low

Based on Table 5, the results of students' mathematical disposition abilities are 26 students (70.27%), 9 students (24.32%), and 2 students who received the high category (24.32%). (5.40%). According to Table 5, the results of trial I show that the highest level of students' mathematical disposition ability is in the high category, followed by the medium and low categories.

Results of data analysis on the effectiveness of the RME-based learning model in trial II

The results of the students' mathematical literacy ability test in trial II are displayed in Table 6 below.

Table 6. Description of Mathematical Literacy Ability Test Results in Trial II

Information	Mathematical Literacy Ability Learning Results Test
The highest score	98
Lowest Value	54
Average	83,95

According to Table 6, it reveals that the average mathematical literacy ability of students in trial II was 83.95 based on their test results. In addition, Table 7 below displays the outcomes of the students' mathematical literacy abilities as demonstrated in trial II.

Table 7. Level of Classical Completion of Students' Mathematical Literacy Ability in Trial II

Category	Mathematical Literacy Ability	
	The number of students	Percentage
Complete	33	89,19%
Not Completed	4	10,81%
Amount	37	100%

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According to the information provided in Table 7, it is evident that the students' learning completeness is determined by their performance in the mathematical literacy ability test. Out of the total of 37 students, 33 students (89.19%) successfully completed the test, while 4 students (10.81%) did not complete it. Based on the established standards for assessing student learning, a significant majority of students (85%) who participated in the mathematics literacy skills test achieved a minimum score of 75.

Student Mathematical Disposition Ability Questionnaire Results in Trial II

To find out this ability, researchers conducted a questionnaire after the learning process was completed. A description of the results of students' mathematical disposition abilities in trial II is shown in Table 8 below.

Table 8. Description of Mathematical Disposition Ability Results In Trial II

Max Score	Students' Mathematical Disposition Ability				
	X_{min}	X_{max}	$\overline{x}$	S	Average
160	111	155	129,18	2,51	87,28

According to Table 8, the data reveals that students have an average mathematical disposition ability of 87.28, with a standard deviation of 2.51. By examining the level of mastery of students' mathematical disposition in the results of trial II, we can observe the data presented in Table 9 below.

Table 9. Level of Mastery of Students' Mathematical Disposition Ability in Trial II

No.	Value Interval	Mathematical Disposition Ability		Information
		The Number Of Students	Percentage	
1	KDM $\geq$ 131,69	29	78,37%	Tall
2	126,67 $\leq$ KDM $\leq$ 131,69	6	16,21%	Currently
3	KDM < 126,67	2	5,40%	Low

Based on Table 9, the results of students' mathematical disposition abilities are 29 students (78.37%), 6 students (16.21%) who received the high category, and 2 students who received the high category. (5.40%).

Description of Improving Students' Mathematical Literacy Abilities with the Developed RME-Based Learning Model

By comparing the average scores obtained from the posttest results of students' mathematical literacy abilities in trial I and trial II, the data obtained from the posttest results of students' mathematical literacy abilities in trial I and trial II were analyzed to determine the increase in students' mathematical literacy abilities. This was done in order to determine whether or not there was an increase in students' mathematical literacy abilities. In the next table, table 10, you will find a summary of how the RME-based learning model that was established in trials I and II helped students improve their mathematical literacy abilities.

Table 10. Description of the Results of Students' Mathematical Literacy Ability in Trial I and Trial II

Information	*Posttest Trial I*	*Posttest Trial II*
The highest score	84	98
Lowest Value	58	54
Average	71,46	83,95

Table 10 shows that The average score for students' mathematical literacy abilities in trial I was 71.46, and it increased to 83.95 in trial II, according to the findings of the analysis of the two trials that were conducted to improve students' mathematical literacy skills. According to

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the findings of the analysis of data on increasing students' mathematical literacy abilities that was presented in chapter III, specifically the increase in students' mathematical literacy abilities that was observed as a result of the average posttest results of trial II being greater than trial I, there is an increase in the average of students' mathematical literacy abilities that is as much as 12.49.

Discussion

It was discovered, on the basis of the findings of the test analysis conducted in both trial I and trial II, that the mathematical literacy skills of the students had satisfied the traditional requirements for exhaustiveness. This is due to the fact that the content and issues that are included in the learning model are designed in consideration of the circumstances that are present in the learning environment of the learner. Students will have an easier time comprehending the content pertaining to quadratic fungus if they make use of the RME-based learning approach that was designed. In the first trial, the students' mathematical literacy abilities were evaluated, and the final exam resulted in a 56.76% achievement rate, with 21 students being deemed complete. As a result, it is possible to draw the conclusion that the implementation of the RME-based learning model that was designed in trial I did not fulfill the requirements for obtaining classical completeness, which is defined as more than 80 percent. Nonetheless, in trial II, the final test achievement of students' mathematical literacy abilities matched the stipulated criterion, namely 89.19%, with 33 students being deemed complete. When it comes to the achievement of students' mathematical literacy abilities, it is thus possible to assert that the RME-based learning model that was built has satisfied the efficacy criteria established.

The implementation of the RME-based learning model, which was established by instructors throughout the early stages of learning, will result in students being more engaged in completing their learning activities. This will be the case so long as they finish their assignments. This leads to more efficient learning and will have an influence on the degree to which students have completed their education in the following classical components: (1) learning syntax; (2) social system; (3) response and management principles; (4) support system; and (5) instructional support and accompaniment (Bruce Joyce, 2012). There are four steps that make up the syntax of this RME-based learning model. These stages are as follows: (1) the provision of actual contextual issues; (2) the display of a mathematical representation; (3) the resolution of contextual difficulties; and (4) the mathematical communication of concepts.

The syntax of this model indicates that the learning produced is learning based on a social system that emphasizes teacher dominance in learning. There is a shift in the teacher's role in this RME-based learning model when compared to direct learning. Based on the components of the reaction and management principles, the teacher does not act as a source of information that provides mathematical concepts and principles in finished form to students, but the teacher bridges interactions between students (discussions in their learning sub-groups and classically) and students with their learning environment (individually in groups with devices learning used) (Hasratuddin, 2018).

Teachers do not dictate to students with a series of mechanistic commands in constructing mathematical knowledge with a realistic mathematical approach or providing solutions to given problems, but rather act as guides who provide scaffolding so that students are able to rediscover these mathematical concepts (Amalia., Surya, E and Syahputra, 2017). This means that students are given the opportunity by teachers to use their potential

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(mathematical literacy skills) and learning experiences before the construction process takes place.

This is in line with Bruner's learning theory, namely that in order for a concept to be more meaningful for students, the concept must be contrasted with other concepts and presented with a variety of examples. In order for students to learn more successfully, students must be given more opportunities to see the connections between one concept and another concept, between one theory and another theory, and between mathematics and other fields (Ruseffendi, 2012). In order to improve mathematical literacy skills, mathematical context must be provided in a realistic literacy form, so that students will construct their knowledge using previous learning experiences.

This RME-based learning model facilitates students to collaborate with each other. Each student in the learning subgroup is an individual who depends on one another (based on different potential) (Slameto., 2010). Problems - Problems raised from realistic problems that exist in real life. Even though students have difficulty solving problems because they are related to previous student abilities, discussion activity with friends and teachers is quite high. With this, there is reason to have faith that pupils will eventually be able to work together and articulate their thoughts numerically. According to Vygotsky's learning theory (Yamin, M., and Ansari, 2008), according to which children's intellectual development is impacted by social variables, this is consistent with the findings. The children's development is naturally influenced by the social and learning environment, which results in an increase in the cognitive complexity and systematicity of the children.

According to the findings of the analysis of the mathematical literacy ability tests that were administered to students in trial I and trial I, the implications of this research are based on the fact that it demonstrates that there is an increase in the mathematical literacy skills of students. Using the average normalized gain, it was determined that in trial I, there was an increase in students' mathematical literacy skills with low criteria, with a score of $\langle g \rangle = 0.29$, and in trial II, there was an increase with medium criteria, with a score of $\langle g \rangle = 0.59$. This evaluation was based on the fact that the average normalized gain was acquired. This is due to the fact that the beginning of the learning process is a presentation of mathematical literacy that includes knowledge that is grounded in reality.

Through this, students are encouraged to take an active role in the production and construction of their own knowledge, beginning with the creation of mathematical models. In order to simplify the process of finding solutions to contextual issues, the mathematical model serves as a representation of the challenge that must be accomplished. Students are able to discover their own mathematical ideas or techniques that are being studied by using this paradigm, which may be used in both casual and formal settings.

Conclusion

Based on the results of the analysis and discussion in this research, it is concluded that: Experts have claimed that the RME-based learning model received an average content validation of 4.77 and construct validation of 4.76, indicating that it satisfies the valid requirements in terms of validity outcomes. The RME-based learning model that was produced fulfills the valid criteria. In terms of the analysis of the outcomes of observations made during the execution of the learning model, the RME-based learning model that was established satisfies the characteristics that are necessary for the learning model to be considered practical. A learning model that is based on RME that was built is effective and fits the requirements. According to the normalized gain index, it was discovered that in trial I, there was an increase in the mathematical literacy abilities of the students who met the "low" criteria, with a value of 〈g〉 = 0.29 (where 〈g〉 is less than 0.3). In trial II, there was also an increase in the mathematical literacy abilities of the students, with the remaining portion falling into the "medium" category, with a value of 〈g〉 = 0.59 (0.7), which is greater than ≥ 0.3. One may thus draw the conclusion that the implementation of the RME-based learning model that was designed has the potential to enhance the mathematical literacy abilities of pupils. Improvement was shown in the students' mathematical disposition questionnaires throughout both trial I and trial II, according to the findings of the analysis of those questionnaires. In the first trial, the average mathematical disposition ability of the students was 82.21, with a standard deviation of 3.81. In the second trial, the math disposition ability of the students was 87.28, with a standard deviation of 2.51. This demonstrates that the use of a learning model that is based on RME enables pupils to increase their mathematical disposition skills.

Recommendation

Based on the research results and conclusions above, the following can be suggested: Teachers can use the RME-based learning model which meets the aspects of validity, practicality and effectiveness as an alternative learning to develop students' mathematical literacy skills and mathematical disposition, especially in class IX. For readers and educational practitioners to be able to conduct similar research and hopefully be able to implement this RME-based learning model on a wider scope. For researchers who want to carry out further development of this learning model, it is important to overcome all the weaknesses that are still found. Apart from that, it is hoped to develop other learning models that can be used for other mathematics materials.

References

Abdurrahman, M. (2017). *Pendidikan Bagi Anak Berkesulitan Belajar*. Rineka Cipta.

Afrilianto, M & Rosyana, T. (2014). Strategi Thinking Aloud Pair Problem Solving Untuk Meningkatkan Kemampuan Kelancaran Berprosedur dan Kompetensi Strategis Matematis Siswa SMP. *Prosiding Seminar Nasional Pendidikan Matematika STKIP Siliwangi*, *2 (1)*, 45-53.

Afrilianto, M. (2012). Peningkatan Pemahaman Konsep dan Kompetensi Strategis Matematis Siswa SMP dengan Pendekatan Metaphorical Thinking. *Jurnal Ilmiah Program Studi Matematika STKIP Siliwangi Bandung*, *1 No.2*.

Amalia., Surya, E and Syahputra, E. (2017). The Efectivness of Using Problem Based Learning (PBL) in Mathematics Problem Solving Ability For Junior High School Student. *International Journal of Advance Research and Innovative Ideas in Education*, *3*, *No. 2:*

Amir, Z., Mulyani, F. R. (2019). Studi Literatur: Pengaruh Penerapan Model CTL terhadap Kemampuan Koneksi Matematis Siswa dan Self Efficacy Siswa. *PRINSIP Pendidikan Matematika*, *1 (2)*, 37-45.

Anggraena., Y. (2021). *PISA 2021 dan Computational Thinking (CT). Modul Pembelajaran*. Koordinator Pengembangan Kurikulum.

Bruce Joyce, M. W. (2012). *Models of Teaching*. Allyn and Bacon & Scuter.

Darmadi. (2017). *Pengembangan Model Dan Metode Pembelajaran Dalam Dinamika Belajar Peserta didik*.

Depdiknas. (2014). *Kurikulum Tingkat Satuan Pendidikan*. Depdiknas.

Vol. 11 No. 3 : July 2024
E-ISSN: 2722-4627
pp. 612-624

Dermawan, Fahmi, R. (2020). Pengembangan E-Modul Berbasis Web Pada Mata Pelajaran Pembuatan Busana Industri. *Jurnal Pedagogi Dan Pembelajaran*, *3(3)*, 508–515.

Fathani, A. H. (2016). Pengembangan Literasi Matematika Sekolah Dalam Perspektif Multiple Intelligences. *Jurnal EduSains*, *4 (2).*, 136-150.

Fatoni, F. M. (2018). Pengembangan Media Pembelajaran Interaktif Online Menggunakan kelaskita Berbantuan Software Geogebra pada materi Perasmaan Kuadrat. *Journal of Education and Practice*, *8 (2)*.

Hasratuddin. (2018). *Mengapa Harus Belajar Matematika?*. Perdana Publishing.

Kardawati, S. Suparman., dan Astutik, K. (2020). Keefektifan Computional Thingking dan Problem Based Learning (PBL) Dalam Meningkatkan Kreativitas Siswa Terhadap Penyelesaian Soal-Soal Cerita Materi Perbandingan (Skala Pada Peta) Di Sekolah Dasar. *Jurnal Karya Pendidikan Matematika*, *Vol 7 Nomo*, 63–68.

Laurens, T., Batlolona, F. A., Batlolona, J. R., dan Leasa, M. (2018). How Does Realistic Mathematics Education (RME) Improve Students' Mathematics Cognitive Achievement? *EURASIA Journal of Mathematics, Science and Technology Education*, *14 (2)*, 569-578.

Lestari, D. F. (2022). Problematika Implementasi Kurikulum 2013 dalam Pembelajaran Matematika di Tingkat Sekolah. *Jurnal PEKA (Pendidikan Matematika), 6 (1)*, 66–76.

Plomp, T. (1997). *Educational Design: Introduction. From Tjeerd Plomp (eds). Educational & Training System Design: Introduction. Design of Education and Training (in Dutch). Utrecht (the Netherlands):* (: Lemma,Netherlands. Faculty of Educational Science and Technology (ed.)).

Putu, I., Stahn, S., & Kuturan Singaraja, M. (2019). Sociocultural-Revolution Ala Vygotsky Dalam Konteks Pembelajaran. *Widya Kumara Jurnal Pendidikan Anak Usia Dini*, *2 No 1*.

Rahmah, J. (2016). Domain Soal PISA untuk Literasi Matematika. *Jurnal Peluang, 1(1).*, 23–35.

Ristanti, F. (2017a). Kemampuan Berfikir Kritis Ditinjau dari Disposisi Matematis Siswa SMP Negeri 3 Purwokerto. *Journal of Mathematics Education.*, *2*, *Nomor 2*, 36-47.

Ristanti, F. (2017b). Kemampuan Berfikir Kritis Ditinjau dari Disposisi Matematis Siswa SMP Negeri 3 Purwokerto. *Journal of Mathematics Education*, *2 (2)*, 36-47.

Ruseffendi, E. T. (2012). *Pengajaran Matematika Modern untuk Orangtua, Murid, Guru dan SPG Seru Kelima*. Tarsito.

Rusman. (2012). *Model-Model Pembelajaran Mengembangkan Profesionalisme Guru*. Rajawali Pers.

Saragih, S., & Habeahan, W. (2014). The Improving of Probem Solving Ability and Students' Creativity Mathematical by Using Problem Based Learning in SMP Negeri 2 Siantar. *Journal of Education and Practice*, *Vol. 5. No*, 123-132.

Sihombing, Nova A dan Fauzi, A. (2017). Perbedaan Kemampuan Komunikasi Matematis Siswa yang Diajar dengan Menggunakan Model Pembelajaran Kooperatif Tipe Think Pair Share dengan Tipe Think Talk Write pada Materi Kubus dan Balok di Kelas VIII SMPN 27 Medan. *Jurnal Inspiratif*, *3 No2*.

Sintawati, M, & indriani F. (2019). Pentingnya Literasi ICT Guru di Era Revolusi Industri 4.0. *Jurnal Ilmiah Pendidikan Matematika*, *1 (2)*, 412–422.

Slameto. (2010). *Belajar dan Faktor-Faktor yang Mempengaruhi*. Rineka Cipta.

Sugiyono. (2018). *Metodologi Penelitian Pendidikan (Pendidikan Kuantitatif, Kualitatif dan*

Vol. 11 No. 3 : July 2024
E-ISSN: 2722-4627
pp. 612-624

R&D). Alfabeta.

Sumarmo, U. (2016). Pembelajaran Matematika Berbasis Pendidikan Karakter. *Prosiding Seminar Nasional Pendidikan Matematika STKIP Siliwangi Bandung*, *1(1)*, 22-32.

Suryanto. (2017). Pendidikan Matematika Realistik Indonesia (PMRI). *Majalah PMRI, 5(1)*, 8–110.

Wahyu Kuncara, A., Sujadi, I. (2019). Analisis Proses Pembelajaran Matematika Berdasarkan Kurikulum 2013 pada Materi Pokok Peluang Kelas X SMA Negeri 1 Surakarta. *Jurnal Fkip Uns*, *4(3)*, 352–365.

Yamin, M. dan Ansari, B. I. (2008). *Taktik Mengembangkan Kemampuan Individual Siswa*. Gaung Persada Press.

Zayyadi, M., Nusantara, T., Subanji, S., Hidayanto, E., & Sulandra, I. M. (2019). A Commognitive Framework: The Process Of Solving Mathematical Problems Of Middle School Students. *International Journal Of Learning, Teaching And Educational Research*, *18(2),* 89-102.