

## Students' Democratic Character and Problem-Solving Ability through Realistic Mathematics Education (RME) at Junior High School

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**Abstract: Democratic Character and Problem Solving Ability Students through Realistic Mathematics Education (RME) at Junior High School.** Students' democratic character and problem solving skills are still low. One of the efforts is by implementing the RME approach. This study aims to analyze students' democratic character, students' problem solving ability improvement, and problem solving ability in terms of students' democratic character after learning through the RME. This is the quantitative research with a one group pretest-posttest design. The population in this study was four classes of grade 8 students from one islamic junior high school/madrasah tsanawiyah (MTs) at Takengon, Aceh, Indonesia. The sample technique was simple random sampling. There were 45 students from two of four classes as a sample. The instruments in this study were observation sheets of students democratic character and problem solving test. Data analysis used an percentage of students' character score, n-gain of students' problem solving ability, and paired t-test to analyze the increasing of students' problem solving ability. The results showed that the development of students' democratic character during the learning process through the RME approach was getting better; there was an increase in students' problem solving ability after participating in learning through the RME approach; and students with high and medium problem solving abilities have a good democratic character. The students' democratic character was further developed at the fourth meeting. Students were seen often to give opinions during group discussions, giving opportunities to express opinions for others, daring to respond to their friends' opinions, listening to their friends' opinions well, actively discussing, working on students' worksheet together, and deliberating to draw conclusions together. Students' democratic character can be trained through RME which has an impact on increasing their problem-solving ability.

**Keywords:** democratic character, problem solving ability, realistic mathematics education (RME).

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### ■ INTRODUCTION

The 21st-century education plays a crucial role not only in developing students' cognitive abilities but also in shaping their character as democratic citizens. Democratic character is a person's personality that encourages students to act in accordance with the values contained in democracy (Frisiliawati, 2022). Students who

have a democratic attitude, will have an attitude of nationalism, responsibility, do not have prejudice, respect each other when there are differences of opinion, do not have an arrogant attitude, and can communicate existing problems so that they do not tend to behave aggressively. Students' democratic values are influenced by the values of democratic teachers (Rowland, 2003;

Johar, et al., 2021). Teachers play an important role in developing and shaping students' democratic character so that the classroom is an important place to develop democratic habits (Topkaya & Yafuz, 2011; Arthur, 2011). In line with this, the International Civic and Citizenship Education Study (ICCS) from 2016 also emphasizes the importance of teaching democracy within educational settings (Schulz et al., 2018). Democratic attitudes can be effectively developed through learning models that emphasize social interaction and contextual learning.

In this context, mathematics education which has often been perceived as an abstract and individualistic field holds the potential to serve as a vehicle for developing democratic character when designed with the appropriate pedagogical approach. One approach that offers a promising framework for this transformation is Realistic Mathematics Education (RME). RME enables teachers to engage students in more collaborative learning processes and to integrate real-world scenarios into instruction (Dinglasan et al., 2023). Developed by Freudenthal (1983), RME views mathematics as a human activity and encourages students to actively engage in solving real-life problems and to work collaboratively. Through this approach, mathematics learning becomes more contextual and meaningful as students are guided to construct understanding through concrete experiences that are closely connected to their lives (van den Heuvel-Panhuizen & Drijvers, 2020).

RME emphasizes three core principles: guided reinvention, didactical phenomenology, and emergent models. Through these principles, students construct their mathematical understanding from contextual problems (Van den Heuvel-Panhuizen, 2001). In line with this, Gravemeijer (1994) explains that RME is a mathematics learning approach oriented toward mathematizing everyday experiences and applying them to real life. In practice, this approach

encourages students to actively construct mathematical meaning through exploration and reflection on relevant situations. Furthermore, through real-world-based tasks and collaborative discussions, students develop models that initially reflect contextual situations but gradually evolve into abstract representations, serving as tools for more formal mathematical reasoning (Yackel et al., 2003). Thus, RME not only bridges the gap between concrete experiences and abstract concepts but also strengthens students' overall mathematical thinking processes.

RME not only emphasizes deep conceptual understanding of mathematics, but also integrates contextual problem-solving as a central component of learning (Freudenthal, 2002), encouraging students to independently reconstruct theories based on their own experiences (Nguyen & Nguyen, 2024). Problem-solving skills are highly relevant to everyday life, as students frequently encounter situations that require creative and logical solutions.

Problem solving ability is an important component needed in various fields in life (Csapo & Funke, 2017). According to Anderson (2009), problem solving is a life skill that involves the processes of analysis, interpretation, reasoning, prediction, evaluation and reflection. Polya (1973) stated that problem solving is an effort to find a way out of a difficulty to achieve a goal. The stages of problem solving according to Polya (1980) are understanding the problem, developing a solution plan, implementing the solution plan, and re-examining the procedure and solution results. Given the importance of problem solving skills, problem solving skills must be given, trained, and familiarized to students in the learning process.

In reality, students' mathematical problem solving skills are still low and far from expected (Simamora & Saragih, 2019; Xu, et al., 2022). Students still experience difficulties in problem solving skills due to lack of confidence and lack

of creativity (Ozreberoglu & Caganaga, 2018). In addition, students tend to memorize mathematical concepts, so students' problem solving skills are very lacking (Verschaffel, et al., 2020). Difficulties that affect mathematical problem-solving can be classified as follows: 1) students are unable to understand all or part of a problem due to a lack of imagination and experience needed to consider the problem; 2) students struggle with reading and comprehension, making them unable to identify key information in a problem and organize it appropriately. As a result, they fail to translate the text into mathematical symbols; and 3) students show low interest in solving mathematical problems due to the length and complexity of the tasks, which leads to a loss of motivation (Phonapichat, Wongwanich, & Sujiva, 2014). In fact, in the learning process at school, teachers should direct students to express ideas, share experiences and knowledge, respect the opinions of others, participate in finding solutions, and make conclusions. In other words, teachers guide students to have a democratic character in learning. This is in accordance with the opinion of Bergem & Pepin (2013) that sharing thoughts with others and listening to other people's opinions is very important for mathematical skills. One approach that is assumed to be able to build democratic character and problem solving skills is by using the Realistic Mathematics Education (RME) approach (Johar, et al., 2021; Ismunandar et al., 2020).

Several previous studies have analyzed democratic character and problem solving ability. Research by Johar, et al (2017) found that the application of a realistic approach in mathematics learning has the potential to develop students' democratic, creative, and independent characters. The type of research used is qualitative research. Ferguson-Patrick (2022) has developed democratic attitudes to increase

student participation and reduce excluding others from a group (bullying). The type of research used by Ferguson is a case study which is a form of qualitative research. Purwadi's research (2020) states that the application of RME can improve students' problem solving skills, because the application of RME can make students more motivated, easy to solve problems, active during the discussion process in learning, and better at communicating their understanding. Based on the description above, there are still limited studies that examine the RME approach to develop democratic character and improve students' problem solving skills. Therefore, the problem formulations in this study are: "1) How is the development of students' democratic character during learning through the RME approach? 2) Is there an increase in students' problem solving ability through the RME approach? 3) How is students' problem solving ability in terms of students' democratic character through the RME approach?"

## ■ METHOD

### Research Design and Procedures

The type of research is quantitative research with a one group pretest - posttest design, where a group is measured and observed before and after treatment. In this study, the independent variable that is the treatment is the realistic mathematics education (RME) approach, while the dependent variable is the students' problem-solving ability which is measured before (pretest) and after (post-test) treatment and students' democratic character. This study aims to analyze students' democratic character during the learning process through the RME approach and to analyze the increasing of students' problem-solving ability through the RME approach.

The learning process was conducted over four sessions. Students' activities during the lessons are presented in Table 1.

**Table 1.** Learning activities on the topic of probability

Meeting	Sub-topic	Learning Activities
1	The empirical probability of an event from an experiment	The learning activity begins with students conducting an experiment using the provided objects. Afterward, students write down the possible outcomes of the event, and finally, students discover the concept of empirical probability
2	The theoretical probability of an event from an experiment	Students in groups are given two problems to conduct experiments and determine the number of possible outcomes, then discover the concept of theoretical probability
3	The relationship between empirical probability and theoretical probability	Students conduct an experiment using the provided objects. This activity aims to explore students' understanding
4	Presenting empirical probability and theoretical probability	Students plot empirical probability and theoretical probability on a graph.

### Participants

The population in this study was four classes of grade 8 students from one Islamic junior high school/madrasah tsanawiyah (MTs) at Takengon, Aceh, Indonesia. The sample technique was simple random sampling. There were 45 students from two of four classes. After obtaining data on democratic character and students' problem-solving ability, then several students were selected to analyze their problem solving ability in terms of students' democratic character.

### Instruments

The instruments used in the study were students' democratic character observation sheets and problem solving ability tests.

#### *Observation Sheet*

Observation is a process of seeing, observing, and observing and recording a person's behavior systematically for a specific purpose. (Haris, 2015). The observation sheet in this study aims to explore the students' democratic character. The observation sheet is adjusted to

five indicators of democratic character. The indicators are 1) expressing opinions; 2) responding to friends' opinions; 3) respecting friends' opinions; 4) discussing to draw conclusions/making decisions; Each indicator contains a description of the students' behavioral or performance rubric representing a score of 1-4 as presented at Table 2. There were three observers who observe students' democratic character. Each observer observes 2 groups of 4-5 students in each group. The observation is conducted by the mathematics teacher at the school who has been trained in democratic character and how to carry out observations.

The observation instrument was assessed for validation. Validation shows the accuracy or validity of an instrument. The assessment was validated by two lecturers from mathematics education program and two mathematics teachers. This validation was carried out to see the accuracy or validity of the indicators of the statement of students' democratic character. Based on this validity, improvements were made so as to produce an appropriate observation sheet instrument and ready for use in research.

**Table 2.** Observation sheet of students' democratic character through RME

No	Indicators of Democratic Character	Aspects being observed	Score				Score
			1	2	3	4	
1	Expressing opinions	Expressing opinions clearly and correctly	Unable to express opinions clearly and correctly.	Expressing opinions fairly clearly and correctly.	Expressing opinions clearly and correctly	Expressing opinions very clearly and correctly	
		Using communicative language so that the information conveyed is easily understood by others	Not very effective in using communicative language so that the information conveyed is easily understood by others	Fairly effective in using communicative language so that the information conveyed is easily understood by others	Good at using communicative language so that the information conveyed is easily understood by others.	Very effective in using communicative language so that the information conveyed is easily understood by others.	
2	Responding to a friend's opinion	Bravely disagreeing with a friend's opinion in a polite and respectful manner, and providing reasons.	Not very confident in politely and respectfully disagreeing with a friend's opinion, and providing reasons	Fairly confident in politely and respectfully disagreeing with a friend's opinion, and providing reasons.	Good at politely and respectfully disagreeing with a friend's opinion, and providing reasons for the disagreement.	Very skilled in politely and respectfully disagreeing with a friend's opinion, and providing clear reasons for the disagreement	
		Being critical of information or viewpoints, so as not to easily accept or reject others' opinions.	Not very critical of information or viewpoints, making it easy to accept or reject others' opinions.	Fairly critical of information or viewpoints, so as not to easily accept or reject others' opinions.	Good at thinking critically about information or viewpoints, so as not to easily accept or reject others' opinions	Very skilled in thinking critically about information or viewpoints, so as not to easily accept or reject others' opinions.	
3.	Respecting a friend's opinion	Listening to a friend's opinion until they have finished	Not very good at listening to a friend's opinion until they have finished.	Fairly good at listening to a friend's opinion until they have finished	Good at listening to a friend's opinion until they have finished	Very good at listening to a friend's opinion until they have finished.	
4	Engaging in deliberation to reach a conclusion/make a decision	Taking responsibility for carrying out the results of the group discussion.	Not very responsible in carrying out the results of the group discussion	Fairly responsible in carrying out the results of the group discussion..	Good at being responsible in carrying out tasks	Very good at being responsible in carrying out the results of the group discussion.	
<b>Total Score</b>							

### Problem Solving Ability Test

The problem solving ability test was long answer questions. There were five questions. The problem solving ability test instrument was validated by two expert lecturers in Mathematics Education, one junior high school mathematics teacher, and one mathematics teacher who familiar with RME. The problem solving ability test was conducted before (pretest) and after (posttest) learning through the RME.

### Data Analysis

Data analysis in this study are two kinds. First, calculating the average of percentage of students' democratic character score from each meeting. The categories of students' democratic character score is presented at Table 3. Second, calculating the the improvement of students' problem solving score using normalized gain (Hake, 1999). The categories of n-gain are presented in Table 2.

**Table 3.** Students' democratic character score categories

Average	Category
76 % - 100%	Good
51% - 75%	Moderate
0% - 50%	Low

**Table 4.** Category of n-gain of students' problem-solving ability

Gain Score	Category
$g > 0.7$	High
$0.3 \leq g \leq 0.7$	Medium
$0 < g < 0.3$	Low

Then, hypothesis testing was carried out to analyse the significant improvement of students' problem-solving ability using paired t-test. The hypothesis was there is a significant difference between the means of students' problem-solving ability, before and after implement RME. The normality assumption was checked before hypothesis testing, using the *Shapiro-Wilk*.

## ■ RESULT AND DISCUSSION

### Development of students' democratic character during learning through the RME approach

Based on observation, the percentage of students' democratic character score of meetings I, II, III, and IV for all indicators is presented at Table 1.

**Table 1.** Students' democratic character score of meetings I, II, III, and IV for all indicators

Meeting	Indicator of Democratic Character						Average
	1	2	3	4	5	6	
I	58%	53%	50%	46%	61%	50%	63.60%
II	66%	59%	51%	57%	71%	55%	71.80%
III	72%	67%	64%	64%	69%	69%	81.00%
IV	78%	77%	71%	69%	76%	80%	90.20%
Average	68.5%	64.0%	59.0%	59.0%	69.3%	63.5%	

Table 1 shows that, overall, the average percentage of students' democratic character score is increase by meeting I which is 63.60%

to meeting IV which is 90.20%. Based on the indicators, it can be seen that indicators 3 and 4 had the lowest scores. At the first meeting,

students did not seem to care about each other, did not want to express opinions or ask questions or discuss with other students, there were some students who did not work on students' worksheet together, and did not even have the initiative to help fellow group members. When learning takes place, some students are just silent in group discussions and do not care about the students' worksheet given. This causes students to struggle in understanding problem-solving concepts because discussions help students test their thinking, correct mistakes, and gain different perspectives. Discussions also stimulate interaction among students, which can deepen their understanding of the concepts being discussed. Additionally, discussions can enhance communication and collaboration skills, which are important in problem-solving.

The development of students' democratic character was further developed at the fourth meeting. Students were seen often to give opinions during group discussions, giving opportunities to express opinions for others, daring to respond to their friends' opinions, listening to their friends' opinions well, actively discussing, working on students' worksheet together, and deliberating to draw conclusions together. This can broaden understanding of the problem and possible solutions, providing money benefits for in grasping problem-solving concepts.

Based on the results of the observation analysis of students' democratic character for four meetings, students' democratic character developed well through RME. Learning by using RME is very helpful for students in achieving the research objectives of developing students' democratic character. This is because learning

with RME provides opportunities for students to rediscover mathematical ideas through a mathematical process that is carried out democratically (Johar, et al., 2021).

**Increasing of students' problem solving ability through the RME approach**

The results of the pretest and post test of students' problem solving skills, obtained the average pretest and post test scores, which are different. This can be seen from the score obtained from the pretest which is 44.04 and the post test is 74.33. The average post test score is greater than the pretest. The n-gain data obtained from the difference between the post test and pretest shows an increase in problem solving ability. This can also be seen from the paired t test of the pretest and post test which obtained a significant value of 0.000 less than the value of  $p = 0.05$ . Therefore it can be concluded that there is an increase in students' problem-solving ability after learning through RME. The results of this study are in accordance with the opinion of Purwadi (2020) which states that the application of RME can improve students' problem solving skills, because the application of RME can make students more motivated, easy to solve problems, active during the discussion process in learning, and better at communicating their understanding.

**Students' problem-solving ability in terms of students' democratic character through the RME approach**

The results of data analysis obtained through the democratic character observation sheet and the student problem solving ability test can be seen in Table 4.

**Table 4.** The n-gain of students' problem-solving ability viewed from their democratic character categories

Students Problem Solving Ability category	Students Democratic Character category		
	Good	Medium	Low
High	5	4	-
Medium	12	27	-
Low	-	1	5

Table 2 shows that students with good democratic character and high problem solving ability are only 5 students and 12 other students have moderate problem solving ability. Students who have moderate democratic character and moderate problem solving ability are almost entirely 27 students, 4 students are in the high problem solving ability category and 1 student is in the low category. Students with low democratic character are only 5 students and these students also have low problem solving skills.

For example, student 8 is a student with a good democratic character (83%) and has high problem-solving ability (0.72). Student 8 is able to understand the problem contained in the

question by writing the elements that are known and asked correctly. It is proven from the 5 questions given, the student wrote down exactly what is known and what is asked in each question. The next step in problem-solving ability is planning a solution, it turns out that student 8 did not write a solution plan to respond to student 8's questions, he only went straight to the answer. The third step is to solve the problem according to plan, student 8 uses the right method and so reaches the correct answer. Student 8 answered 4 questions correctly and one question was answered incorrectly due to a calculation error in question 5. Figure 2 presents one of the results of student 8's problem-solving answer.

**Dik:** 1 Dadu dan 1 koin dilempar secara bersamaan  
Dadu (1, 2, 3, 4, 5, 6) Koin (Angka dan Gambar)

**Dit:** Peluang teoritik muncul mata dadu 3 dan angka.

**Jawab**

Dadu \ Koin	1	2	3	4	5	6
A	A1	A2	A3	A4	A5	A6
G	G1	G2	G3	G4	G5	G6

∴ Jadi Peluang teoritik mata dadu 3 dan angka  $\frac{1}{12}$

**Given:** A die and a coin are tossed simultaneously.  
Die (1, 2, 3, 4, 5, 6)  
Coin (Heads and Tails)

**Asked:** What is the theoretical probability of rolling a 3 on the die and getting heads on the coin?

**Answer**

Dadu \ Koin	1	2	3	4	5	6
A	A1	A2	A3	A4	A5	A6
G	G1	G2	G3	G4	G5	G6

Thus, the theoretical probability of rolling a 3 on the die and getting heads is  $\frac{1}{12}$

**Figure 1.** Student 8's answer

In addition to having high problem-solving skills, student 8 also has a good democratic character. At the first meeting, student 8 was still not very serious about following learning activities through the RME approach, students still often joked and chatted with other friends, but student 8 was active in giving opinions in discussions. Student 8 in giving opinions also used good language that was easy for others to understand, he would repeat the explanation to others if the first presentation was not understood. At the second meeting, student 8 had started to be active in discussions, giving opinions and being critical in responding to friends' opinions. However,

student 8 was less accustomed to respecting friends' opinions, student 8 sometimes interrupted his group members.

In the third meeting, the democratic character value of student 8 decreased. Student 8 was not good at expressing opinions in terms of language and intonation usage and was still not good at respecting friends' opinions. Furthermore, in the fourth meeting, the democratic character of student 8 had developed. Student 8 had been active in the discussion, started using good language, started to respect his friends, listened to his friends' opinions until they were finished, and did not interrupt his group

mates. Student 25, who also has good democratic character, but has problem-solving skills in the medium category, answered questions 1 through 4 well and met each indicator of problem-solving ability. However, for question 5, the student did not answer at all, which resulted in a reduced score. To address this, an interview was conducted with Student 25, and the information obtained revealed that the student did not have enough time. The student spent too much time understanding the question and thinking about the steps to solve it, so when time ran out, the student was unable to complete question 5. This issue could be attributed to factors beyond democratic character, as stated by Dwianjani, Candiasa, and Sariyasa (2017), who noted that the ability to determine a solution strategy is the most important factor affecting problem-solving skills. This means that when students are unable to think of a solution

strategy, they will not be able to proceed to the next stage, which is executing their plan, resulting in lower problem-solving ability.

In addition to Student 8 and Student 25, who have good democratic character, there is also Student 5, who is categorized as having moderate democratic character (61%) and high problem-solving ability (0.71). Student 5 listed all the information provided in the problem. Then, the student was able to plan the solution to be implemented, but at the stage of executing the plan, the student did not do it correctly, which led to an incorrect result. The checking stage was carried out by drawing a conclusion from the answer given. Out of the 5 questions, Student 5 had difficulty implementing the plan for question 5, whereas in the other stages, Student 5 performed well. Below is one of the results of Student 5's problem-solving test.

<p>Dik : Hidangan Pembuka = (sup, Salad)                  Hidangan utama = (ikan, ayam, daging sapi, Vegetarian)                  Hidangan Penutup = (buah, es krim, puding)                  Dit : Berapa Peluang hidangan pembuka sup dan hidangan utama daging</p> <p>Jawab</p> <p>Pembuka sup = <math>\frac{1}{2}</math>                  hidangan utama daging sapi = <math>\frac{1}{4}</math>  <math>\frac{1}{2} + \frac{1}{4} = \frac{2}{6}</math>                  ∴ Jadi Peluang pesanan <math>\frac{2}{6}</math></p>	<p><b>Given:</b> Appetizer: Soup, Salad                  Main Course: (Fish, Chicken, Beef, Vegetarian)                  Dessert: (Fruit, Ice Cream, Pudding)  <b>Asked:</b> What is the probability of ordering Soup as the appetizer and Beef as the main course?  <b>Answer:</b>                  Appetizer: Soup = <math>\frac{1}{2}</math>                  Main Course: Beef = <math>\frac{1}{4}</math>  <math>\frac{1}{2} + \frac{1}{4} = \frac{2}{6}</math>                  So, the probability of ordering Soup and Beef is <math>\frac{2}{6}</math></p>
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Figure 2. Student 5's answer

In addition to having high problem-solving skills, Student 5 has a moderate democratic character. During the first and second meetings, Student 5 was not active in group discussions, tending to be passive and not responding to the opinions given by classmates. However, in the third and fourth meetings, Student 5 became more active in discussions and completed the activities

in the student worksheets. Student 5 no longer felt shy or afraid to express opinions, and the student began to gain confidence and feel responsible for the group's results. This shift can be attributed to Student 5's understanding and ability.

Generally, students with high and medium problem solving abilities have a good democratic

character. On the other hand, a negative attitude toward problems and a lack of constructive problem-solving skills can have a detrimental effect on one's ability to resolve interpersonal issues, as well as trigger emotional responses and behaviors such as anger and aggression (Bedel & Ari, 2012). Altun (2003) also found that individuals who prioritize human dignity as their core value are the most successful in problem-solving. Moreover, democratic values significantly contribute to the improvement of problem-solving skills (Özbey, 2021).

Three out of the four aspects of democratic character significantly influence students' problem-solving abilities, namely: 1) Expressing opinions – When students articulate their opinions accompanied by a deep understanding of the problem and a clear problem-solving strategy, they can effectively demonstrate their mathematical problem-solving skills to their peers; 2) Responding to peers' opinions – By engaging in open, respectful, and constructive dialogue, students can support each other in developing their mathematical problem-solving abilities. Conversely, if a student does not fully grasp the concept of problem-solving, they can respond to peers' opinions or ask questions to deepen their understanding and enhance their skills; dan 3) Engaging in discussions to reach conclusions or decisions – In the context of mathematical problem-solving, this involves analytical and collaborative thinking. Such discussions help identify problems, explore solutions, enhance comprehension, and enable students to make better-informed decisions.

Based on the discussion of the research results that have been described, it appears that learning with the RME approach can develop students' democratic character and improve students' problem solving skills. This is in accordance with Johar et al. (2021) that the application of a realistic approach in mathematics learning has the potential to develop students' democratic, creative, and independent

characters. Nufus' research (2021) also states that realistic mathematics learning does not only always emphasize cognitive indicators, but also builds positive character values. RME is an approach that is carried out by linking real things that come from students' experiences. Learners are not enough to memorize concepts but rather the ability and mastery of problem solving through real objects and phenomena found in everyday life. RME is one of the approaches in learning mathematics that if done in a planned manner through habituation consistently, continuously and consequently is believed to be able to develop democratic character values.

The implementation of Realistic Mathematics Education (RME) also has a positive impact on students' problem-solving skills (Ventistas et al., 2024). RME is effective in enhancing students' motivation, self-confidence, problem-solving ability, and reasoning skills, which ultimately contributes to the improvement of their cognitive achievement (Bray & Tangney, 2015). RME makes students active in learning, students are free to explore their knowledge and foster the courage to try new things. The use of RME provides special competencies for students, namely finding and understanding the concept of learning material more deeply, inseparable from students' problem solving skills.

In the RME approach, what can support the development of students' democratic character is the use of real-world contexts that connect mathematical concepts with students' daily experiences. So that a pleasant learning atmosphere is created in the group, where students feel that their efforts and contributions are valued, students have the freedom to solve problems according to their abilities, students with high abilities can express themselves in activities with mathematics, while students with medium and low abilities can also still enjoy mathematics by discussing. Therefore, there is potential for the development of democratic, creative, hard work, and independent characters.

The RME approach is one approach that can improve students' problem solving ability. Where students are directly involved in identifying problems, formulating problems, analyzing problems, determining ideas, organizing ideas, clarifying unclear terms and concepts, collecting facts about problems, discussing problems, generating alternatives, and proposing solutions to problems. RME learning provides opportunities for students to re-propose mathematics itself. Informal strategies given by students become inspiration as an introduction to informal forms to formal procedures. Students are given an activity or realistic problem then students search and create strategies based on their existing knowledge. The results given by students are diverse so that group discussions and interactivity occur in the learning process.

#### ■ CONCLUSION

Based on the results of the research and discussion that has been stated in the previous description, the following conclusions can be drawn: 1) students' democratic character through RME has developed; 2) students' problem solving ability after participating in learning through the RME approach has increased; and 3) Students with high and medium problem solving abilities have a good democratic character. Mathematics teachers should pay attention to students' problem-solving abilities in terms of the development of students' democratic character by involving guidance and counseling teachers. Considering that students have problems such as shy students, family problems, and other problems, then by collaborating with guidance and counseling teachers, it can be known more deeply how students' problem-solving abilities are in terms of the development of students' democratic character.

The one-group pretest-posttest design used in this study has limitations, as it involves only a single class, making it difficult to determine whether RME is the sole factor contributing to the

observed improvement. Further research involving comparisons between experimental and control to conduct deeper information exploration to find out the problems of student character that can affect students' problem-solving abilities and involve more students.

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