



Improving Students' Self-Confidence and Problem-Solving Ability Through RME Approach with TTW Type Cooperative Learning Model Setting

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Abstract

Students studying mathematics get training in developing their problem-solving skills. Cognitive capacity and self-confidence can have an impact on problem-solving skills. This study aims to increase students' confidence and mathematical problem-solving skills through the TTW-type cooperative learning model RME approach. Research this class action with the Kemmis & Taggart model that can cover several cycles. The implementation of this study is two cycles with the research subjects of 28 grade VII students at a junior high school in Surakarta in the 2022/2023 academic year. Data is obtained through observation and tests. Data analysis techniques are carried out with descriptive statistics and supported by qualitative analysis of student work results. Based on the results of data analysis, confidence, and mathematical problem-solving skills, students have improved in each cycle. Students' confidence average score increased from 35.7 in the pre-cycle to 67.8 in the first and 84.8 in the second cycles. Students' mathematical problem-solving skills increased from an average score of 60 pre-cycle to 72.7 in the first cycle and 78.3 in the second. This study increased self-confidence and mathematical problem-solving skills for grade VII junior high school students by applying the RME approach to setting the TTW-type cooperative learning model seen from an increase in average scores quite significant with 49.1 and 18.3, respectively. This finding shows the need for further efforts to achieve improved mathematical problem-solving skills that are more optimal.

INTRODUCTION

Students study mathematics in order to be able to solve math problems in the real world. According to Putra et al. [1], problem-solving skills teach students to understand challenges, design solutions, implement those solutions, and analyze the results. Cognitive capacity and self-confidence can have an impact on problem-solving abilities. In direct learning observation, lack of confidence in finding solutions to the questions given by the teacher. Students will change the answer if it does not match other students' responses. In addition, when asked to advance to do questions in front of the class by the teacher, at most three students volunteered to promote. Most of the learning is focused on teachers. Students need to be more involved in finding and identifying structures, suspecting and verifying, considering hypotheses, understanding cause and

effect, abstraction, and concluding. These problems result in students' math skills still needing to improve. Putra et al. [2] concluded that out of 36 students in one of the junior high schools, only ten students (27.78%) had high-category comprehension skills. This finding has the potential to result in low problem-solving skills.

The challenges mentioned by students above have answers, especially students' confidence in their ability to solve given mathematical puzzles. According to Yeti et al. [3], knowledge will be practical if there is confidence in working on a problem. Meanwhile, Asikin & Junaedi [4] concluded that Realistic Mathematics Education (RME) could help junior high school students improve their communication skills by asking them to work on contextual problems involving comparison and a system of linear equations with two variables. In their research, Susanti & Nurfitriyanti [5] found that the RME learning paradigm impacts the ability to find solutions to mathematical problems. In line with Supandi et al.'s statement [6] that based on classroom observations during the learning process with the Think Talk Write (TTW) strategy, many students are enthusiastic about learning mathematics and actively present questions and competitively answer problems and answers.

Mathematics classes with RME techniques with the TTW are one of the lessons that cause confidence and learning outcomes to increase. The RME approach is learning using problems around students so that concepts can be obtained and apply them to other relevant issues [7]. The TTW-type cooperative learning model is a learning activity created by utilizing the thinking, speaking, and writing process. Landysa stated that [8] TTW-type cooperative learning approach is for students to participate in the learning process as a whole. Students should think, speak, and write while learning in individual and group settings, with assignments and responsibilities given under the TTW-type cooperative learning paradigm. The learning stage with the RME approach setting the cooperative model of the TTW type is, first, the grouping of students and the provision of contextual students' worksheets containing mathematical texts and work instructions (reality). Second, reading mathematical texts and making summaries on individual answer sheets students (think). The summary includes things students need help understanding in mathematical texts (Intertwinement). Third, discuss the resume's content with group friends (talk) by explaining, solving, comparing, and discussing answers to create solutions to the stated problem (activity). Fourth, make the results of the discussion as a conclusion that comes from the previous stage at each (Level), then (write) write it on the available students' worksheets (Interactivity). The teacher guides students to conclude and reinforces the discussion results (Guidance). This study's RME approach to setting the TTW-type cooperative model is expected to increase students' confidence and mathematical problem-solving skills.

Self-confidence will increase one's desire to learn, and the more confident a person is, the more enthusiastic they will be in achieving their goals, including learning success [9]. Learning with their confidence impacts student innovation, thus providing ease of learning mathematics [10]. Martalasari et al. [11] stated that innovation is one of the essential processes in the learning process. Thus, there can be a process of understanding a difficulty in everyday life, expressing thoughts as thoughts, and overcoming obstacles by utilizing this capacity. The following are indicators of self-confidence proposed in this study first, dare to say opinions. Second, Ask the teacher. The third answered the teacher's question. Fourth, dare to make a presentation.

Efforts to find growing problem-solving, the ability to solve problems rationally and mathematically through a multi-step solution search process, are known as problem-solving skills [12]. The following are indicators of mathematical problem-solving skills proposed in this study in Polya [13]our understanding related to problems (understanding the problem), preparation of problem-solving plans (devising a plan), implementing the problem-solving programs (carrying out the plan), the re-examination of problem-solving (looking back).

This study aims to describe and increase students' confidence and mathematical problem-solving skills through the Realistic Mathematic Education approach of the TTW-type cooperative model. This research has a different purpose from the study conducted by Suparya [14], namely to see the influence of the TTW-type cooperative learning model on learning outcomes and critical thinking skills.

METHOD

This research uses class action research with the Kemmis & Mc Taggart [15], by covering two cycles, each stage, namely planning (plan), implementation and observation (act & observe), and reflection (reflect). The Kemmis & Taggart model action research procedure can be visualized in Figure 1.

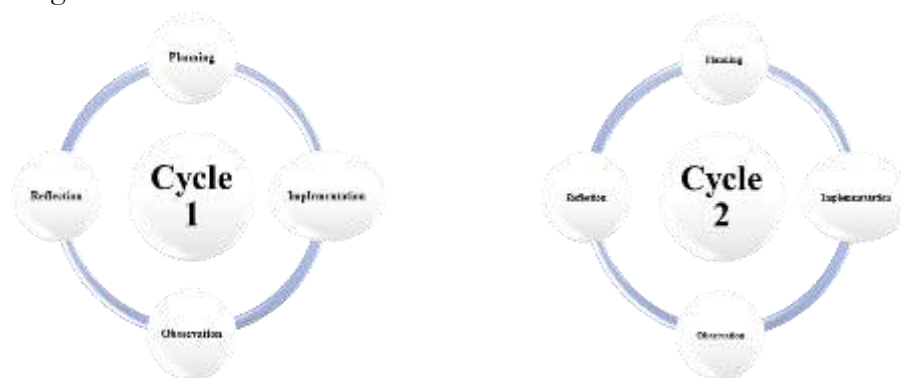


Figure 1. PTK Kem & Mc. Procedure Taggart

This research used the subjects of eighteen male students and ten female grade VII students at a junior high school in Surakarta as subjects receiving the action. The research time was carried out from September 2022 to December 2022.

The data collection was conducted using an observation sheet and tests that have been declared valid by two experts in the field of mathematics education. Data from observation sheets are used to observe learning activities and learning activities focused on indicators of self-confidence by students. Meanwhile, tests are used to determine whether or not there is an improvement in problem-solving ability. Analysis of observation results by researchers using 2 (two) scales, namely, carried out (score 1) and not carried out (score 0).

This study uses test scores. The problem-solving ability will be compared between pre-cycle and cycle 2 using test results on a scale of 0 to 100. In this study, indicators of success are determined, namely the minimum average self-confidence and the mathematical problem-solving ability for students to reach a score of 75.

RESULTS AND DISCUSSION

The Implementation of the RME Approach with TTW-Type Cooperative Learning Model Setting

Pre-cycle learning is carried out using a conventional model that only focuses on teachers and expository techniques, which emphasizes the repetitive use of formulas and exercises and decreases students' ability to solve problems. Romadhoni & Setyaningsih [16] all indicators of problem-solving skills have not been able to be met by students with soft skills. Student activities in the pre-cycle of lack of student participation resulted in students being passive. Therefore a solution to this problem is needed, namely through the RME approach setting the TTW-type cooperative model. In line with Susandi & Widyawati's [17] opinion, applying RME, students' ability to analyze, evaluate, and conclude is essential in solving contextual problems. TTW, this effort to increase learning belief can occur because students are accustomed to making small notes or expressing their ideas and are accustomed to communicating mathematical ideas to friends and teachers in front of the class, then this can have a positive impact on students' belief in learning, without hesitation students can easily express views [18].

Implementation of learning in cycle 1 with the material "Linear Equations and Inequality." With pre-prepared teaching modules using the RME approach to setting the TTW type cooperative model. In more detail, the implementation of learning is based on RME syntax.


Table 1. The Implementation of RME setting cooperative model type TTW in Cycle 1

Syntax	Description
Using contextual problems	Teachers provide contextually based students' worksheets on linear equations and inequalities. Examples of problems are as follows: <div data-bbox="721 1182 1356 1561" data-label="Image"> </div>
Explain contextual problems	The teacher explained the contextual problem by reading the questions in the students' worksheets, and then the students were asked to state the form of inequality.
Resolving contextual problems	In groups of students working on students' worksheets, namely stating the form of inequality to form a rounder team, students write it on the available students' worksheets.
Comparing and discussing answers	Students are asked to compare and discuss answers through group discussions. Group representatives presented the results of the discussion.
Conclude	Students conclude the results of the discussion that has been carried out as a summary.

In cycle 1, learning looks less effective because many students chat outside the assigned discussion, so the problems given in students' worksheets cannot be done and appropriately understood by students. The RME approach to setting the TTW-type cooperative model applied to cycle 1 still needs to be improved. Therefore, learning is carried out again in cycle 2 to correct the shortcomings in the previous cycle. Therefore it is necessary to improve the learning scenario, which leads to increased student response following the ongoing learning process.

Implementation of learning in cycle 2 with the material "Linear Equation." With the same approach as learning scenarios that lead to increased student response. In more detail, the implementation of learning is based on RME syntax.

Table 2. The Implementation of RME setting cooperative model type TTW in Cycle 2

Syntax	Description
Using contextual problems	Teachers provide contextually based students' worksheets with linear equation material. Examples of problems are as follows:  <p>The image shows a worksheet titled "Mari Mencoba" (Let's Try). It features a photograph of a white cup filled with dark coffee. Below the photo, the text reads: "Sumber: Dokumen Puskarbuk. Kopi susu dibuat dengan mencampur 160 ml susu dengan 120 ml kopi. Berapa ml susu harus ditambahkan pada 180 ml kopi untuk membuat kopi susu dengan komposisi yang sama?" (Source: Puskarbuk Document. Milk coffee is made by mixing 160 ml milk with 120 ml coffee. How much milk must be added to 180 ml coffee to make milk coffee with the same composition?).</p>
Explain contextual problems	The teacher explained the contextual problem by reading the questions in the students' worksheets, and then students were asked to state the equation's form and the equation's solution.
Resolving contextual problems	In groups of students working on students' worksheets, namely stating the form of inequality to form a rounder team, students write it on the available students' worksheets.
Comparing and discussing answers	Students are asked to compare and discuss answers through group discussions. The actual outcome of the group discussion was presented.
Conclude	Students conclude the results of discussions carried out in the form of summaries.

In cycle 2, most students still remember how to solve the problem. Some answer by assembling variables, compiling equations, and solving equations. 4 groups dare to present in front of the class, and the answer is correct. It indicates that students need help understanding concepts and making calculation errors [19]. There is a significant improvement concerning

student responses and problem-solving abilities to learning materials in cycle 2 from the results of direct observation through the implementation of learning.

The Improvement of Students' Self-Confidence

The lack of participation in the pre-cycle resulted in students being passive. The average score of the pre-cycle self-confidence indicator is 35.7, which means that students' self-confidence is still low. Increasing self-confidence in cycle 1 was achieved by giving students worksheets in groups. The average score of self-confidence has grown from the pre-cycle, namely 67.8. In cycle 1, there are still low indicators of the courage to ask the teacher, and many students hesitate to make presentations. Therefore, it is necessary to improve scenarios of learning activities that lead to increased student responses in participating in the ongoing learning process. There was a significant increase in cycle 2. The average self-confidence score is 84.8. Diagram 1 shows an increase in students' self-confidence scores in each cycle.

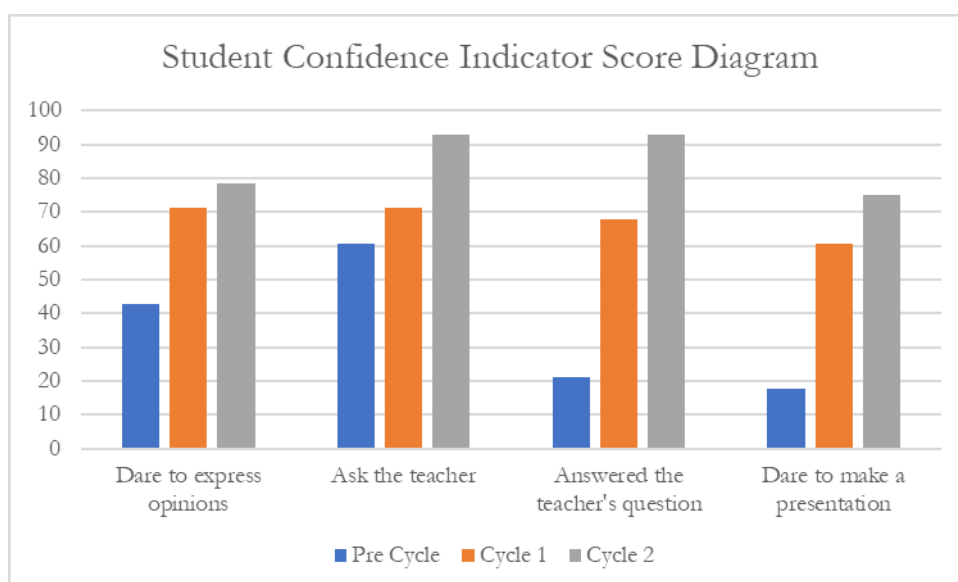


Diagram 1. Students' Self-Confidence in Each Cycle

In working on students' worksheets, observations are made to students who dare to express opinions, ask teachers, answer teacher questions, and dare to present. The average score of student self-confidence increases from pre-cycle to cycle 2. In this study, an indicator of success, namely the minimum average of self-confidence, reached a score of 75. This study's results align with Wahyuni & Rejeki [20], which state that the approach of learning activities that can improve students' mathematical communication skills is RME. In cycle 1, there are still low indicators of daring to ask teachers, and many students hesitate to appear in presentations. Therefore, learning scenarios need improvements that increase student responses following the ongoing learning process. Self-confidence helps students solve a problem without hesitation so they can solve it to the maximum [21].

The Improvement of Students' Mathematical Problem-Solving Skills

Pre-cycle students' mathematical problem-solving ability test scores until cycle 2 are presented with the processing results of students' problem-solving ability test scores in Table 3.

Table 3. Scores of Students' Mathematical Problem-Solving Ability

Cycle	Topic	Score		
		Lowest Score	Highest Score	Average
Pre cycle	Algebraic form	40	75	60
Cycle 1	Similarities and inequalities	60	92	72,7
Cycle 2	Application of linear equations	70	92	78,3

Based on Table 3, the average value from pre-cycle to cycle 2 has increased. This finding is in line with Nasrulloh & Umardiyah research [22], which stated that 'TTW learning is successful and traditional knowledge does not improve a person's problem-solving ability. An analysis of student work results is carried out to support improving students' problem-solving skills.

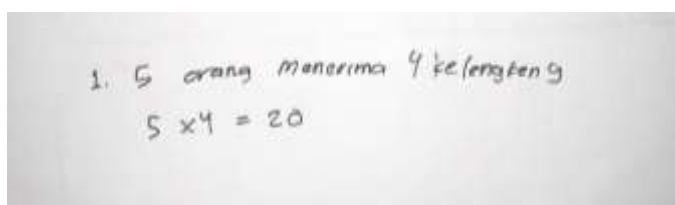


Figure 2. A Written Work in the Pre-Cycle (A Student with the Lowest Improvement)

Based on Figure 2, students' mathematical problem-solving skills experience a low increase in each cycle. In pre-cycle, students only can write what is known in the problem but are incomplete and need help understanding the problem. Figure 3 shows the student's written work with the lowest improvement in cycle 1 and cycle 2.

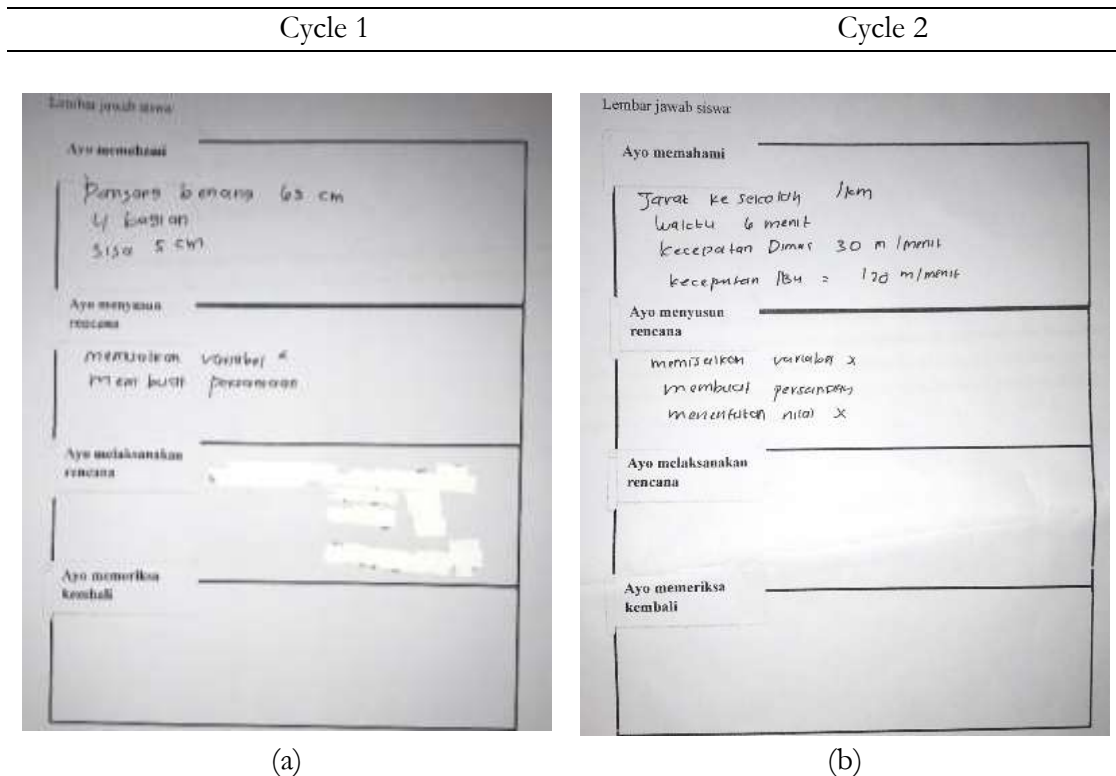


Figure 3. A Written Work in the Cycle 1 and Cycle 2 (A Student with the Lowest Improvement)

Based on Figure 3, in cycle 1 and cycle 2, students can solve problems. Polya steps at the stage of issues of understanding and planning to problem-solve. However, students have yet to be able to work on the sets of carrying out problem-solving and checking problem-solving. So, there is a low increase from pre-cycle to cycle 2 in problem-solving capabilities with Polya steps. In line with Ramziah & Sutiarto's [23] opinion, the key to problem-solving skills is reading and understanding problems.

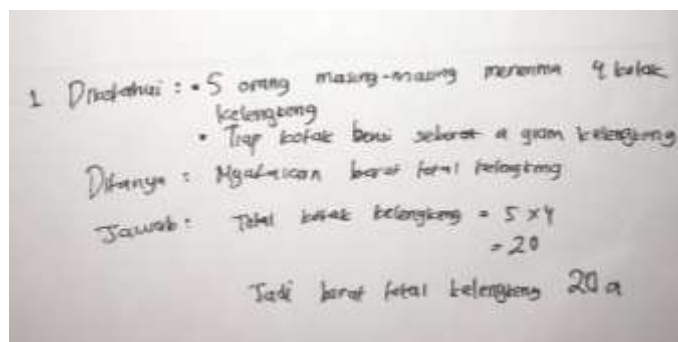


Figure 4. A Written Work in the Pre-Cycle (A Student with the Highest Improvement)

Based on Figure 4, students' mathematical problem-solving skills experience a high increase in each cycle. In pre-cycle, students can solve the problem but cannot devise a plan in detail. Figure 5 shows the student's written work with the highest improvement in cycle 1 and cycle 2.

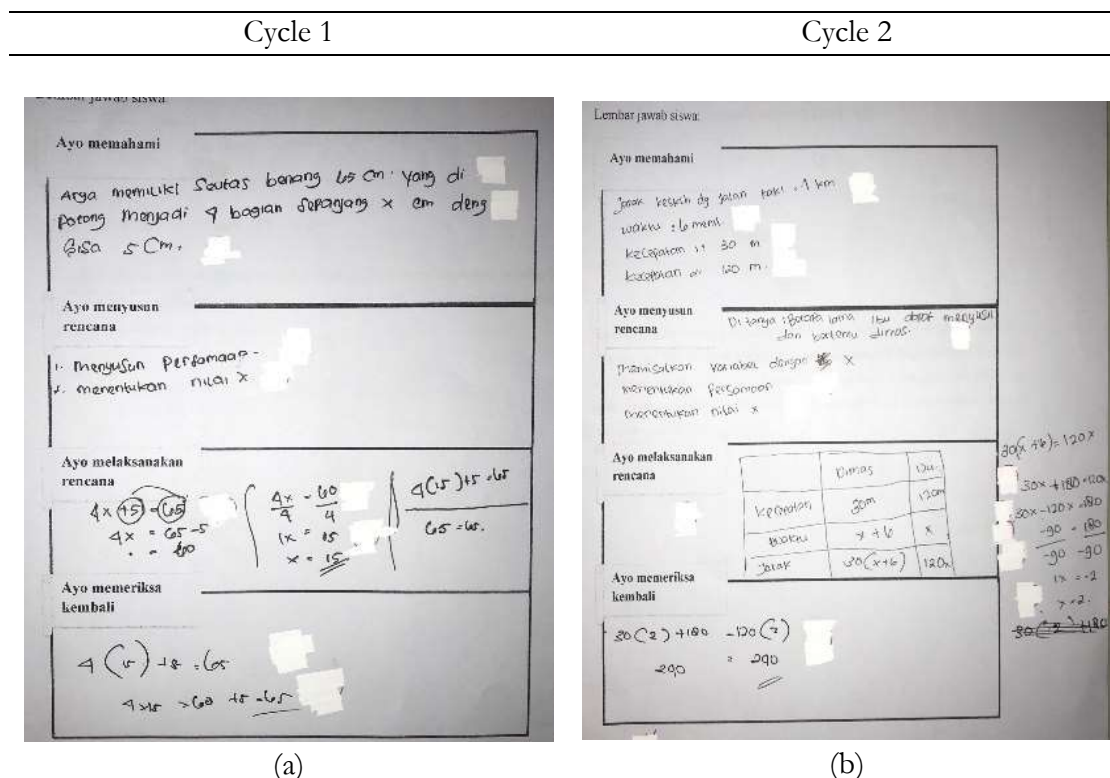


Figure 5. A Written Work in the Cycle 1 and Cycle 2 (A Student with the Highest Improvement)

Based on Figure 5, in the pre-cycle, students only can write down what is known in the problem, be able to understand the problem, and solve the problem. In cycles 1 and 2, students can have problem-solving skills with Polya steps at all stages. So, there is a high increase from pre-cycle to cycle 2 in problem-solving capabilities with Polya steps. Nugroho & Sutarni [24] stated that in solving the problem, systematic efforts must be used, namely, the Polya steps.

Problem-solving skills are a core part of the learning process [16]. This study has achieved indicators of success, namely the minimum average ability to solve mathematical problems for students to reach a score of 75. This study's results align with Hadi & Radiyatul's [25] opinion that solving with Polya steps is an excellent qualification for improving students' mathematical problem-solving skills.

CONCLUSION

Applying the RME approach to setting the TTW-type cooperative model can increase self-confidence and mathematical problem-solving skills for grade VII junior high school students. Students' confidence and mathematical problem-solving skills have increased in each cycle. Students' self-confidence increased from an average score of 35.7 in the pre-cycle to 67.8 in the first and 84.8 in the second cycles. Students' mathematical problem-solving skills have improved from an average score of 60 in the pre-cycle to 72.7 in the first cycle and 78.3 in the second cycle.

The study results concluded that applying the RME approach to setting the T^TW-type cooperative model can increase the self-confidence and mathematical problem-solving skills of grade VII junior high school students with a relatively high increase in average scores, namely 49.1 and 18.3, respectively. Students' average confidence and mathematical problem-solving skills reached a score of 75. It is recommended that other researchers develop learning modules using the RME approach to setting the T^TW-type cooperative model for different materials and try it out on several discussion topics so that the resulting better product.

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