



The Combining Realistic Mathematics Education (RME), Problem Based Learning (PBL) and Teams Games Tournaments (TGT) Model in the Education of Elementary School

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Abstract. Creating an innovative learning model is the goal of teachers. This is important to improve student activities and learning outcomes, especially in the classroom. The research aims to propose a new model for the education of elementary schools. By using the Classroom Action Research (CAR) approach that had been carried out in two cycles, this research combined three learning models: 1) Realistic Mathematics Education (RME), 2) Problem Based Learning (PBL) and 3) Teams Games Tournaments (TGT). The result of combining these three models can increase teacher activity (teacher's activity score reaches 97 - very good category), student activity (student's activity score reaches 87 - very active category), and student's learning outcomes (cognitive 87, affective 87, and psychomotor 90 - complete category for all aspects). Overall, the evaluation of the combining model has shown significant results as a beneficial indicator of innovative learning strategies for elementary schools. In addition, this research could be used as a consideration in choosing a learning model that effectively improves the activity and learning outcomes of elementary school.

Keywords: Learning Model, Realistic Mathematics Education, Problem Based Learning, Teams Games Tournaments, Elementary Teaching

1 Introduction

Education is a place that can help everyone explore and develop the potential and abilities that exist within them. Education has a very important role in human life, as stated in Law No. 20 of 2003 which states that national education functions to develop abilities and shape dignified human character and civilization to educate the nation's life, aiming to develop the potential of students to become human. who believe and fear God Almighty, have a noble character, are healthy, knowledgeable, capable, creative, inde

pendent, and become responsible citizens [1]. In the 2013 curriculum, the learning carried out is expected to provide a balance between cognitive, affective, and psychomotor aspects. In the process, this curriculum emphasizes student-centered learning, with this learning it is hoped that learning will become more interactive [2].

The teaching and learning process occurs if there is an interaction between students and the learning environment regulated by the teacher so that they can achieve the goals of teaching [3]. In the learning process carried out by teachers as educators, they have a very important role in achieving success in the learning process [4]. From this explanation, as an educator, the teacher must be able to make student-centered learning and carry out the teaching and learning process by loading activities that can encourage the creativity of students so that active, creative, and fun learning occurs in every subject, no exception math subject.

Mathematics needs to be taught as early as possible starting from the elementary school level, this aims to give students the ability to think logically, critically, analytically, and systematically and be able to solve the problems they face in everyday life [5]. Mathematics learning is a process of providing mathematical knowledge, both cognitive, affective, and psychomotor so that later students could think, reason, and imagine [6]. Mathematics learning has a goal as stated in the Badan Standar Nasional Pendidikan (BSNP). Students are expected to 1) can understand mathematical concepts and apply these concepts flexibly, accurately, efficiently, and precisely in solving a problem, 2) use reasoning, 3) be able to solve problems, 4) communicate ideas with symbols, tables, diagrams, or other media, and 5) have curiosity, attention, and interest in learning mathematics as well as a tenacious and confident attitude in solving problems [7].

Based on the explanation above, the teacher must be able to carry out ideal learning so that the learning objectives can be achieved. Teachers must be able to make students active in learning, make students understand the concepts of the material being studied, students are expected to be able to solve problems, and have an interest in understanding the learning delivered by the teacher to gain broader knowledge. This is in line with the opinion of [8] that learning mathematics for elementary school children has a strategic function for the success of mathematics education at the next level. However, it was found that the mathematics learning that is currently being carried out has not been carried out optimally. It was found that student learning activities can still be said to be low where students are still not actively involved in the learning process. Learning that is not yet centered on students causes learning to tend to be boring, so it affects student activities. The lack of use of media and learning models can also cause learning to be passive and can lead to a lack of student understanding of the material which results in student learning outcomes. Some students have not been able to solve the problems that exist in learning, and most of them have difficulty when faced with questions with different patterns from the examples presented. The cause of the low activity of students in learning is conventional and monotonous learning where learning is dominated by the teacher so that students get bored quickly which results in student activities in participating in learning [9].

Based on the results of observations and interviews with the homeroom teacher of class V, Mrs Nurul Aulia, S.Pd, it was found that from 30 students in total only 12

(40%) students were active in learning activities and 18 (60%) other students had not been actively involved in learning activities so that this problem needs to be followed up so as not to cause a prolonged impact. In addition, student learning outcomes also show that in the 2021/2022 academic year in mathematics the results obtained tend to be incomplete and the report cards obtained by students often have not reached the graduation target. Of the 30 students in total, only 20 (67%) students succeeded, and 10 (33%) other students had not been able to achieve the target of passing grades, so this problem needs to be followed up so as not to cause a prolonged impact. This problem cannot be left without action. The impact that can occur is the low activity of students in learning is still low so that learning becomes passive, students' low understanding of the concepts of the material being studied, students' ability to solve problems is low, students' lack of enthusiasm in participating in the learning process which has an impact on student activity and learning outcomes. This issue needs to be followed up, so it does not occur sustainably. As educators, teachers must be able to carry out innovative learning activities, teachers must be able to choose suitable strategies and methods and learning models so that they can be used to improve student learning activities and outcomes. The researcher offers alternative problem-solving by applying the Realizing Game model which is a combination of Realistic Mathematical Education (RME), Problem Based Learning (PBL) and Teams Games Tournaments (TGT) models. The purpose of this study is to describe the activities of teachers in learning, as well as to analyze increasing student activity in learning and to analyze the improvement of student learning outcomes in learning. This research can make learning activities more fun and involve students actively in learning activities. This research is important to improve the learning process and increase the activeness of students in learning mathematics to improve student learning outcomes.

2 Method

2.1 Research Design

This study used a qualitative and quantitative approach through classroom action research (CAR). CAR is a strategy used to solve problems by utilizing real actions and the process of developing capabilities in detecting and solving problems. CAR is research conducted by teachers in the classroom through self-reflection to improve the quality of the learning process to obtain an increase in student learning outcomes [10].

The indicators of success in this study are (a) the teacher's activity is said to be successful if it reaches a score on the observation sheet with a range of 30-36 with a very good category, (b) student activity is said to be successful if it reaches a score of 26-31 with a very active category and classical completeness students with a very active category get 82%, and (c) student learning outcomes in learning are said to be successful if individual completeness reaches a score of 70 and classically it is said to be successful if 80% of students reach a score of 70.

Data collection was carried out through an approach to observing the teachers' activities and students' activities during the learning process using teacher activity sheets,

individual student activity sheets, and student activity sheets in groups. The data analysis process is carried out by calculating the acquisition of activity scores as follows: 1) 9 aspects of assessment for teacher activities, 2) 8 aspects of assessment for student activities consisting of 8 aspects, and 3) student learning outcomes (individual and group)

2.2 Research Sample

This research was conducted in the fifth grade of SDI Hidayatullah Taman Hudaya which consisted of 30 students consisting of 12 male students and 18 female students. The factors observed in this study were teacher activities, student activities and learning outcomes. Qualitative data were obtained from the results of observations of teacher activities and student activity observation sheets and individual student answer sheets in participating in learning. Quantitative data were obtained from the number of students who achieved classical completeness in activities and learning outcomes at each meeting.

3 Result

This research was conducted in two cycles, where each cycle consisted of two meetings. Activities start from planning, implementation, observation, and reflection [11].

3.1 Cycle 1

Planning.

In this activity, the teacher first prepares learning tools such as lesson plans, teaching materials, media, LKPD, and learning resources, the aim of which is to facilitate the research process and facilitate data analysis.

Implementation.

At this stage, the teacher carries out what has been planned (the learning process), which is implemented starting from the preliminary, core and closing activities. In the introductory activity, the teacher prepares students to be ready to learn. In the core activity, the teacher explains the learning material along with the use of learning media, and then the teacher invites students to read the material in the book and asks students to observe the examples in the book. In the next activity, the teacher asks students to observe the pictures pasted on the blackboard and answer the questions given about the material. After that the teacher divides students into groups and gives assignments or group worksheets (LKK) to each group, after students finish discussing, the teacher asks each group to convey the results of their discussions in front of the class and provide opportunities to ask other groups or provide feedback. After the discussion activity is over, the teacher prepares a tournament by asking each group to send a representative to play. In this tournament, the best group will get an award. In the closing activity, the

teacher conducts reflection activities to review the material that has been studied. To measure students' understanding, the teacher gives evaluation test questions for students to do individually.

Observation.

For the teachers' activities, there are 9 aspects observed, namely: 1) Teacher activities in explaining the objectives and delivering learning materials, 2) Teacher activities in providing contextual problems orally to stimulate thinking skills and student activity in learning, 3) Teacher activities in forming heterogeneous groups of 4-5 people in each group, 4) Teacher activities in providing contextual problems that exist in the books or worksheets given, 5) Teacher activities in guiding students to discuss with groups to solve the problems given, 6) Teacher activities in guiding presentation activities from the results of group discussions, 7) Activities teachers in presenting games or tournaments, 8) teacher activities in giving awards to students, and 9) teacher activities in directing students to make conclusions

During the learning process, the teacher is not only limited to teaching but also observes what students do through observation sheets. There are 8 aspects observed in students, namely: 1) How students pay attention to the teacher's explanation, 2) How do students answer questions from the teacher, 3) How do students follow the teacher's directions in group division, 4) How do students understand the contextual problems presented by the teacher, 5) How do students in group discussion activities analyze problems and find solutions to solve existing problems, 6) How to present the results of group analysis, 7) How students participate in the tournament, and 8) How students make learning conclusions.

Reflection.

At this stage, the teacher analyzes what was done during the learning process, and then the results are taken into consideration for the next learning process. From the results of the reflection of the first cycle, the indicators of success have not been achieved, both in terms of student activities and learning outcomes. At meeting 1, in terms of student activities, not all students are actively involved in learning, this is because the teacher has not provided contextual problems perfectly, so learning is more focused on textbooks and teacher explanations. At meeting 2, learning is presented contextually, it's just that in the group there are students who dominate so not all students are actively involved in the learning process. The summary of the results of teacher activities, student activities and student learning outcomes in cycle 1 can be seen in Table 1- Table 3.

Table 1. Teachers' activity score in cycle 1

Meeting	Score	Criteria
1st	27	Good
2 nd	29	Good

Table 2. Students' activity score in cycle 1

Meeting	Score	Criteria
1 st	47%	Enough
2 nd	60%	Enough

Table 3. Students' learning outcomes in cycle 1

Meeting	Cognitive	Affective	Psychomotor	Criteria
1st	47%	43%	47%	Not Complete
2 nd	60%	57%	63%	Not Complete

Judging from the lack of success indicators in cycle 1, the teacher made improvements to the strategies used. In increasing student activity, the teacher must motivate and pay more attention to students in working in groups, so that students are actively involved in learning and no student dominates. In improving learning outcomes, material explanations also need to use learning media that are easy to understand and remember by students and need to emphasize important points in language that is easier for students to understand, and the level of difficulty of the questions is also considered (according to the students' thinking stages).

3.2 Cycle 2

Based on the results of the reflection in cycle 1, in cycle 2, improvements were made in various aspects, such as planning, implementation, and evaluation.

Planning.

In this stage, the teacher makes improvements to learning tools such as lesson plans, teaching materials, media, and learning resources, the aim of which is to overcome the obstacles that occur in cycle 1. The lesson plans are made more detailed so that teachers are easier apply them more. The teaching materials and media used are more in line with the needs of students. Learning resources also involve the environment around students.

Implementation.

At this stage, the teacher carries out what has been planned (the learning process), which is implemented starting from the preliminary, core and closing activities. Armed with experience from cycle 1, in cycle 2, the teacher made improvements to learning strategies and classroom management. When learning takes place, the teacher provides material related to problems related to student life, so students will think about solving problems with their abilities. To find out the level of student's understanding and make learning more interesting, the teacher explores students' knowledge by conducting quizzes that are packaged in the form of competitions. This competition is made so that they compete to become champions. So that students will pay more attention to learning because the sooner he gets.

Observation.

So that all students are actively involved in learning, in addition to filling out observation sheets, the teacher also supervises the activities of each group by going around each group, so that no more students dominate in group activities.

Reflection.

The summary of the results of teacher activities, student activities and student learning outcomes in cycle 2 can be seen in Table 4- Table 6.

Table 4. Teachers' activity score in cycle 2

Meeting	Score	Criteria
1st	31	Very Good
2 nd	35	Very Good

Table 5. Students' activity score in cycle 2

Meeting	Score	Criteria
1 st	73%	Active
2 nd	87%	Very Active

Table 6. Students' learning outcomes in cycle 2

Meeting	Cognitive	Affective	Psychomotor	Criteria
1st	77%	73%	77%	Complete
2 nd	87%	87%	90%	Complete

From the results of the reflection of cycle 2, the indicators of success in this study have been achieved, both in terms of student activities and learning outcomes. At meeting 1, students were already actively involved in learning, where the achievement presentation showed 73%. Student learning outcomes have also increased, with classical completeness presentations reaching 87%.

4 Discussion

The Realistic Mathematical Education (RME) learning model is a learning model that uses contextual problems as a starting point in learning, the problems given are related to students' real lives. The advantage of this model is that it can provide students with a clear understanding of mathematics. The RME model is expected to provide meaningful learning for students so that it can motivate them to be actively involved in learning [12]. The second model is Problem Based Learning (PBL) which is useful for preparing students to think critically and analytically. This model can encourage students to be able to solve problems with their abilities [13]. The PBL model can make students more active in learning, active in group discussion activities and make students active in finding information to solve problems in learning [14] that students become more

active in finding information to be able to solve problems. The third model is the Team Games Tournament which contains elements of games and competitions, with this model, students can learn while playing [15]. This model can make students enthusiastic about learning, the activeness of students in learning creates a conducive and fun learning atmosphere. Tournament activities in this model can trigger students to develop critical thinking skills. The game in this model aims to make students learn to relax. The combination of this model is expected to overcome the problem of low student activity and student learning outcomes. With this model, it is hoped that it can make learning activities more fun and can involve students actively in learning activities, which can help students to understand the concepts of learning materials, so those good learning outcomes are obtained.

This is reinforced by previous research conducted by [12], [16], and [17] concluded that the Realistic Mathematics Education (RME) learning model can improve student activities and learning outcomes. The RME learning model provides opportunities for students to find their concepts in solving problems and helps students to be more active in finding answers [18]. Research conducted by [19] and [20] concluded that the Problem Based Learning (PBL) learning model can improve student activities and learning outcomes. With the PBL model students are invited to be actively involved in learning so that they can improve their ability to solve problems [21]. Research conducted by [22], [23], [24], and [25] concluded that the Teams Games Tournament (TGT) learning model can improve student activities and learning outcomes. This model can help students become actively involved in learning, help foster student enthusiasm in participating in learning activities, foster collaboration and foster an attitude of responsibility [26].

In summary, classroom action research was carried out in 2 cycles, where in cycle 1 various obstacles resulted in not achieving indicators of success, but by reflecting on what had been done, so that in the implementation of cycle 2 it was better in its implementation, which in the end indicators defined success has been achieved. In this study, improvements were made more to strategies and learning methods, but still paying attention to the steps of the combination of Realistic Mathematics Education (RME), Problem Based Learning (PBL) and Teams Games Tournaments (TGT) learning models, in the second cycle there was an increase which is significant both from the activities and student learning outcomes. Moreover, some things can be discussed as follows.

The first discussion relates to increasing teacher activity. Every aspect that was observed increased at each meeting, this increase occurred due to the efforts made by the teacher to improve the learning process seen from the reflections made so that aspects that were still not optimal could be improved and improved. Reflection is carried out by the teacher to assist the teacher in seeing the advantages and disadvantages of carrying out learning so that it can be improved so that learning can be carried out optimally. The success of the teacher in carrying out learning activities depends on the teacher. Research by [27] states that the effectiveness of learning lies in the teacher, where the success of learning is determined by the quality and ability of the teacher in planning activities, implementing activities and how teachers manage classes which will affect student activities and learning outcomes. Teachers have an important role in learning and become one of the determining factors for the success of teaching and

learning activities carried out. Teachers as educators must be able to manage classes well, where teachers must be able to create a comfortable learning atmosphere for students [28]. Teachers as educators must be able to create interesting and fun learning situations so that students have enthusiasm and enthusiasm in participating in classroom learning [22]. In the learning process teachers are required to provide conducive learning, teachers must be able to carry out activities by actively involving students in learning [29].

The second discussion relates to increasing student activity. Every aspect observed has increased at each meeting, this shows that the Realing Game model can help increase student activity in participating in learning. The increase in student activity at each meeting occurred due to an increase in the quality of learning carried out by the teacher. So, it can be said that improving the quality of learning by teachers can have an impact on increasing student activity. This shows that learning activities designed by teachers must be oriented to student activities [30]. Learning activities are important in the learning process, this is because, without activities, the learning process cannot be carried out [31]. Therefore, the teacher must be innovative in creating a learning atmosphere so that learning is comfortable and fun, with this atmosphere, the learning delivered by the teacher is easier for students to accept [29]. To be able to produce good and quality learning, a teacher must have the ability to apply learning methods or models that follow the material being studied and the needs of students [32].

The third discussion relates to improving student learning outcomes. The success or failure of learning depends on how the teacher processes and modifies learning so that students can receive and master the material as optimally as possible [15]. Teachers as educators are required to be able to carry out good and effective learning. Effective learning is quality learning carried out by the teacher, which in the process involves active student participation. Effective learning allows students to be able to learn easily and with fun so the expected learning objectives can be achieved [33]. Improving student learning outcomes cannot be separated from the teacher's role in providing good learning to students. In the process, the teacher provides an explanation of the material in language that is easy for students to understand, the material presented is close to the students' daily environment so that students can more easily understand the material presented. The increase in student learning outcomes is also due to the cooperation that exists between students, and the existence of fun learning activities so that students do not feel burdened in learning so that students' abilities can develop. A teacher must be able to provide useful learning for students so that they can develop the abilities and potential that exist in students. This is in line with the opinion of [34] that teachers must be able to establish a good communication pattern in groups and can create a good and conducive learning atmosphere to improve learning outcomes. Learning outcomes are an important thing for teachers, it is an indicator of success for a teacher and students. Learning outcomes themselves are results that appear during teaching and learning activities carried out which are marked by a change in behavior that can be measured in several domains, namely the affective, psychomotor, and cognitive domains [35]. To find out student learning outcomes, it is necessary to have an evaluation carried out by the teacher. The evaluation itself is an action taken to determine whether a person achieves success in learning after going through the learning process [36].

The fourth discussion relates to the development of a new learning model, which is a combination of RME, PBL and TGT. The use of the Realistic Mathematical Education (RME) learning model encourages students to be active in teaching and learning activities that are carried out and this model expects that students can independently construct the knowledge they gain through learning activities [17]. The next combination model is Problem Based Learning. This model invites students to be actively involved in learning. Learning activities carried out by students can improve students' critical thinking skills and can make students could solve problems that exist in learning [21]. The last learning model is Teams Games Tournaments (TGT). This learning model brings games and tournaments into the process. These activities can help to foster student enthusiasm during the learning process because students want to prove that they are smart and become the best [37]. This is in line with the opinion of [26] that the TGT learning model can help to actively involve students in learning, this model can also help to foster student enthusiasm in participating in learning activities, foster cooperation and foster an attitude of responsibility.

5 Conclusion

The results showed that the application of the Realing Game learning model to the mathematical content of the data presentation material could be carried out properly and following with the learning steps made to increase student activity and learning outcomes. In the teachers' activity, there is an increase in each meeting from the "good" criteria to "very good". In student activity, there is an increase in each meeting from the "quite active" criteria to the "very active" criteria and for learning outcomes, students have been able to achieve the minimum completeness that has been set, namely getting a score of 70 and classically percentage reaching 82% complete in all aspects of both cognitive, affective, and psychomotor. So, it can be concluded that the application of the Realing Game model can increase teacher activity, student activity and student learning outcomes.

The main contribution of this research is a new learning model. Based on a theoretical perspective, this research has provided a new learning model for mathematics education in elementary schools by combining Realistic Mathematics Education, Problem Based Learning and Teams Games Tournaments learning models for the context of mathematics lessons. Meanwhile, based on a practical perspective, this research is the initial foundation for the application of Realistic Mathematics Education, Problem Based Learning and Teams Games Tournaments learning models for elementary school contexts.

In summary, from the evaluation process of this research, teachers can consider choosing and implementing learning models that will be used in learning, teachers can use various learning models according to the material to be taught to create effective and efficient teaching and learning atmosphere. Besides that, it can also be used as reference material to add insight, knowledge, and skills for further research.

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