An Analysis of Realistic Mathematics Education Activities of Pre-service Teachers Trained with a Constructivist Approach

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Abstract: Due to the nature of RME, which sees mathematics as a human activity, there is never a fixed and complete theory for mathematics education. Therefore, it is seen as an approach that still needs to be developed. The aim of this research is to analyze the RME (Realistic Mathematics Education) activities prepared by the pre-service primary school teachers who were educated with a constructivist approach. Participants were 137 student teachers who have been trained with a constructivist approach for about 15 years and will teach with this approach. It was determined that the activities prepared by the pre-service primary school teachers were generally at a medium-level in terms of compliance with RME. The results of the research show that no matter how much education they had, the effects of constructivist education could not overcome some traditional patterns in pre-service teachers. In addition, the training they had about RME was not enough to break these patterns. It has been observed that pre-service teachers are insufficient in preparing activities for the basic principles of constructivism with RME. This shows that the disruption in the education system started at the undergraduate level. With this beginning, an endless cycle is formed. In order to avoid the basic patterns brought by traditional education, learning approaches such as the RME approach in addition to the constructivist approach should also be employed at lower grade levels.

INTRODUCTION

Constructivism defines people as active beings who seek to understand the world around them and explore their environment. By interacting with their physical and cultural environment, people embed a newly experienced situation into their existing schemas or revise them and take a step towards learning. They need an active and constructive teaching process. However, this process takes longer than traditional teaching with knowledge transfer. Teachers have noticed that students who prefer to learn in a short way are successful in the exam, but they forget this information easily (Quintero & Rosario, 2016). Therefore, it is seen that there are still university students who

cannot make sense of fractions (Akbaba-Dağ & Kılıç-Şahin, 2019; Çetin, 2020) and the number line (Cumhur & Korkmaz, 2020).

In teaching a discipline in the constructivist approach, it is important to provide students with the opportunity to explore, make assumptions, discuss them and gradually develop active knowledge. In this approach, the context and problem or issue that leads to the topic we want to address is introduced, and then students are allowed to develop their own solutions. Because of such features, constructivism is very similar to the Realistic Mathematics Education (RME) approach. Zulkardi (1999) stated that there are three types of constructivist approaches in mathematics education. With radical constructivism, there is the construction of knowledge in the mind and students develop their own meanings, where students lack the social dimension. In social constructivism, it is argued that a social process is effective in constructing knowledge. A socio-constructivist, on the other hand, emphasized that mathematics should be taught through problem solving, students should develop their own strategies, and the importance of student-teacher and student-student interaction. Adopting a socio-constructivist perspective provides a collectivist perspective on teaching and learning that allows students to share and present their activities within the classroom community (Gravenmeijer, 2020). In this sense, it is the socio-constructivist perspective that is closest to RME among the constructivism types (Van den Heuvel-Panhuizen, 2003). RME and socio-constructivism are not only compatible but also complementary approaches (Gravenmeijer, 2020). Moreover, Gravenmeijer (2020) stated that RME can be seen as an integral part of a socio-constructivist approach because it will not be possible to apply RME in norms suitable for traditional mathematics education. Before the socio-constructivist, RME had a more individual, psychological perspective, but with the socio-constructivist approach, the interaction and cooperation roles between students were added and it was effective in the formation of the interaction principle, an important principle for RME (Inharjanto & Lisnani, 2018). Socio-constructivist makes an important contribution to the implementation of RME in the classroom in that it draws attention to classroom culture. In addition, it can be stated that RME also makes an important contribution to socio-constructivism in structuring mathematical knowledge and supporting students (Cobb & Yackel, 1996).

As in constructivism, it is emphasized in RME that students should learn from the contexts they have experienced (Author, 2015). Because daily life situations are more effective than formulas in making sense of the subject. For example, in the teaching of fractions, when the occupancy rate in a theatre is told, it can be provided to visualize the region model (for example, rectangle) and say how many of them can be full. The most distinctive feature of RME is that it gives an important place to rich "realistic" situations in the learning process. Realistic situations are important in terms of answering the student's question "what will this do for us" on the one hand, and interesting problems that need to be solved on the other hand. Therefore, the problems presented to students in RME may come from the real world, as well as from the world of fairy tales or the formal world of mathematics, as long as the problems are empirically real in the mind of the student (Van den

Heuvel-Panhuizen & Drijvers, 2020). From this, it can be concluded that RME is a combination of real-life problems and socio-constructivist mathematics teaching offered by the teacher (Rabbani & Muftianti, 2020).

In cases where the constructivist and RME approach is effective, first of all, the classroom culture should be organized, the social norms of the classroom should be changed and reorganized should be tried to make it more useful in the classroom environment. For this, teachers should identify students' reasoning situations and create teaching activities that support students in expanding and developing their current thinking styles (Gravenmeijer, 2020). It is stated that, thanks to the teachers' preparation for the lesson using RME, they enable their students to understand and deal with mathematics more (Dickinson & Hough, 2012).

Teaching activities are a set of systematically organized materials, both written and unwritten, to create an environment that allows students to learn. Good teaching activities - materials prepared according to the RME approach range from building student knowledge based on daily life experiences to find a mathematical concept (Rabbani & Muftianti, 2020). Activities are an important component in learning as they are used to help learn about the subject (Dickinson & Hough, 2012). The structured and systematic activities required to be prepared in this research and the grade level, learning area, sub-learning area, duration, learning outcomes, skills and values, learning and teaching process (strategy, method, technique, learning environment, materials used), process steps and evaluation stages are discussed.

Wahyudi, Joharman and Ngatman (2017) follow the active learning model as activities to be prepared by RME enable learning by doing, the student-centred learning model for students to solve problems themselves under teacher guidance, and the guided learning model as students need to invent and reinvent mathematical concepts and principles. They stated that the inquiry-based learning model should have supported the contextual learning model in terms of including the problems students encounter in their daily lives, and the constructivist learning model as students are directed to rediscover their mathematical knowledge by solving and discussing problems.

The features of the activities developed according to the RME approach and following constructivism should be as follows:

- Students need to develop hypothetical learning frameworks that include anticipating their mental activities and thinking about how they relate to learning goals.
- Students should be encouraged to think for themselves and explain their thoughts.
- It is of great importance that students who are willing to do mathematics and without fear of failure participate in the studies.
- Teachers should be encouraged to avoid judging students by external standards or comparing them to their classmates, and instead to consider students' personal development as an evaluation criterion (Gravenmeijer, 2020).

Despite the 50-year history of RME, it is still a developing approach that requires further work, especially in classroom applications (Van den Heuvel-Panhuizen & Drijvers, 2020). RME considers mathematics as a dynamic human activity and is not seen as a fixed theory. Therefore, studies on RME are valuable and contribute to the literature. Teaching activities are essential for creating meaningful learning, and it is important to examine the competencies of teachers and pre-service teachers in preparing activities for primary school students. The study analyzes the RME activities prepared by pre-service primary school teachers trained with a constructivist approach to reveal their proficiency in creating RME activities.

METHOD

Procedure and Participants

This study, which was conducted to determine the preparation of RME activities by pre-service primary school teachers educated with a constructivist approach, was carried out using the descriptive method. The reason for using the descriptive method is to determine the current situation of pre-service primary school teachers, who are expected to have a constructivist education approach, while preparing RME activities without any intervention of researchers. Descriptive studies allow describing a given situation as precisely and carefully as possible (Büyüköztürk, Çakmak, Kılıç, Karadeniz & Demirel, 2011). Descriptive research aims to describe, compare, classify and analyze the parts that make up the event in order to reveal what it is (Cohen, Manion & Morrison, 2000).

Purposeful sampling method was used because some criteria were taken into consideration in the determination of the study group (being a pre-service teacher, being in the third grade, having taken educational science courses such as Instructional Technologies, Teaching Principles and Methods, Basic Mathematics in Primary School, Mathematics Teaching I). While determining the study group, the condition of starting their primary school education in the 2005-2006 academic years was sought as a criterion. The study group consists of 137 pre-service primary school teachers who are studying in the third grade in the 2020-2021 academic year from three different universities to ensure maximum diversity. The reason for studying with pre-service primary school teachers in the third grade is that they have taken educational sciences courses such as Instructional Technologies, Teaching Principles and Methods in the previous semesters, as well as a lecture on how the constructivist approach and RME approaches are used in mathematics education in the "Mathematics Teaching I" course for one semester. In addition, since the 2005-2006 academic years in Turkey, education in which the constructivist approach is adopted has begun to be given. Pre-service teachers in the third grade have just started primary school in these years. All educational lives of the pre-service teachers participating in the research were shaped according to the constructivist approach. In this sense, it is expected that the activities that students will create will be designed in accordance with the constructivist approach. The volunteering and willingness of the pre-service teachers included in the study group were taken into consideration.

Data Collection Tool

The steps in the model of realistic mathematics education in developing a learning environment include giving contextual problems, group discussions involving horizontal and vertical mathematization processes in rediscovering mathematical concepts, giving other problems with the material, and presentations. Pre-service primary school teachers were asked to prepare activity plans. Therefore, activity plans suitable for Realistic Mathematics Education prepared by pre-service teachers were used as a data collection tool. In this plan, some instructions were given to pre-service teachers. In line with these guidelines, pre-service teachers prepared an activity plan for any acquisition they chose from the "natural numbers and operations" learning field at the second grade level of primary school.

Data Collection Process

Pre-service primary school teachers took the "Mathematics Teaching 1" course, which is included in their curriculum, and they had theoretical knowledge about RME within the scope of this course. At the same time, sample activity plans suitable for RME were shown to pre-service teachers. Pre-service teachers were informed before the study and documents showing that they approved to participate in the study were collected. The activity templates for the activities that they will prepare in the last week of the term and the instruction stating the acquisitions they should choose from the "natural numbers and operations" learning field were shared with the pre-service teachers over the distance education programs. Pre-service primary school teachers were given a 2-week process and were asked to send their activity plans at the end of the process. It was stated that the activity plans made by the pre-service teachers did not have a scoring regarding the content of the course, and they were also asked to prepare the activities originally without plagiarizing from any source. The activity plans sent by the pre-service primary school teachers were analysed and the activity plans, all of which were completed, were included in the analysis process.

Data Analysis

The qualitative data obtained from the activities prepared by the pre-service primary school teachers in line with RME were analyzed using the quantitative analysis approach. Analyzes made by quantifying qualitative data are included in the literature, and analysis was carried out using semantic content analysis and quantitative analysis methods in line with the approaches put forward by Abeyasekera (2005) regarding the quantitative analysis of qualitative data. The semantic content analysis includes areas and sub-areas related to the subject to be analysed and includes indicators related to these areas. In the study, four main categories were revealed by using the categories prepared by Wahyudi, Joharman, and Ngatman (2017) to evaluate the activities prepared by pre-service teachers for the RME approach. The fifth category is the category of reasoning, this category was not included in the research because the activities were not implemented in the classroom. The categories and indicators determined for the RME activities prepared by the pre-service primary school teachers are given in Table 1.

Category	Indicator
Understanding the daily problem / content	Teachers pose contextual problems and ask questions to guide students' understanding of the problem.
Explaining the contextual problem	Explaining the problem to the students about the given problem.
Solving contextual problems	Directing students to solve problems in groups or individually. Allowing students to use different ways of solving the problem. Using the activity sheet to enable students to work on the problem and solve problems of different difficulty levels. To motivate students to solve problems in their own way by providing direction in the form of questions and motivation. Reflecting the RME's vertical mathematization tool (use of the model) and relevance (use of the relationship).
Comparing and discussing answers	To facilitate discussion and to compare and discuss answers to problems in groups. Utilizing student contributions and interaction between students.

Table 1: Evaluation Categories and Indicators for Realistic Mathematics Education Activities

The qualitative data obtained from the RME activities prepared by the pre-service primary school teachers were transformed into quantitative data in line with the specified categories and indicators. While converting to quantitative data, the scoring scale prepared by the researchers was used in scoring the categories, and the scoring and sample activity statements are given in Table 2.

Category	Sample Activity Statements		
	Suitable (2 points)	Partially suitable (1 point)	Not suitable (0 points)
Understanding the daily problem / content	(Activity 43) Before entering the math lesson, the teacher asked the students, "What floor is your house on, and how many steps do you use to go up and down until you reach the house? Does anyone know how many steps are there? Did you ever pay attention to the steps of the stairs at school? How many steps are there? I want you to count how many steps there are when going up the stairs at the break." He starts the lesson by giving examples from daily life.	(Activity 103) In this course, students are told that they will learn to recognize the rules of number patterns and how to find the missing number. They are asked the difference between the numbers 1-3-5-7-9 written on the zebra. After the answers, they are asked to think about what the pattern rule will be and they are allowed to find the +2 rule.	(Activity 96) The teacher instructs the students to move to a seating arrangement where everyone can see each other easily. The teacher asks the students questions about the topic.
Explaining the contextual problem	(Activity 114) The teacher presents the animation and educational video content that he has prepared with Web 2.0 tools to the students. In line with the videos watched, the students are asked questions and the concepts related to the subject to be learned are associated.	(Activity 58) At the beginning of the activity, the students are divided into two different groups in terms of their success levels. The groups sit together so that they can see the teacher. The teacher selects any card and shows it to the groups. Cards are the form of expressions such as whole, half and quarter. He says that the group with the highest score will be rewarded.	(Activity 61) The problem is transferred to the board by the students in the form of mathematical operations. Then the teacher explains the relationship of the numbers and the subject of comparison.
Solving contextual problems	(Activity 46) He asks students how they put in order the pictures and gives time to each group for the students to talk about the images. The teacher tells the students the correct order once. The teacher checks the studies of each group.	(Activity 105) He asks students to write down the two best selling foods on the blank carton for Questions 3 and 4. During this whole process, the teacher moves between the groups and answers the students' questions and asks them to be careful when using scissors.	(Activity 52) The question (''Is there a relationship between the numbers ?'') is asked to the students. As a result of the activity, the number patterns that the groups complete their missing numbers are shared with the class.

Comparing and discussing answers	(Activity 14) A discussion environment is created in the class and other friends say that there is no need to jump on both sides, but the student is told that this approach makes sense. Student's enthusiasm is unbreakable. In this way, the student discovers shortcuts, makes practice, and provides rediscovery in new contextual situations. They implement this in the next step. Students arrive at a generalization here. It concludes that the number is rounded to whichever side it is closer to.	(Activity 125) Students are shown pictures of kangaroos, frogs, rabbits and grasshoppers. Students are asked to tell their friends what they know about these animals. It is asked if they have a common feature like nutrition, movement, etc.	(Activity 87) The activity process is explained to the students. If students have questions about the activity, they are answered. Finally, the teacher collects and evaluates the completed worksheets.

Table 2: Scoring for The Evaluation of Realistic Mathematics Education Activities

In Table 2, the activities prepared by the pre-service teachers were evaluated. Each category scores between 0-2 points. By adding the scores given to the categories, the pre-service teachers' preparations for RME activities were determined. Quantitative scores obtained were analyzed using descriptive statistical methods, frequency and arithmetic mean. Levels were determined to make sense of the mean scores. In this context, for each category and RME, 0-0.66 points indicate "low", 0.67-1.33 points indicate "medium" and 1.34-2.00 points indicate "high" level.

In the study, the RME activities prepared by the pre-service primary school teachers were evaluated according to the determined categories, and each researcher independently analysed and evaluated 35 activity plans to ensure the reliability of the analysis. Later, the researchers came together and evaluated the activities together according to the RME. In order to ensure the reliability of the coding carried out, "peer review" was carried out at the last stage. Peer review is an external control mechanism to ensure the reliability of research data (Lincoln & Guba, 1985). The evaluations made according to the indicators within the determined categories were presented to the opinions of two independent experts who had a doctorate in mathematics education. All of the evaluations made following the indicators in the categories were analysed by experts, and the evaluations with consensus and disagreement were calculated using the formula [Reliability = Consensus / (Consensus + Disagreement)] determined by Miles and Huberman (1994). After the calculations, the reliability value was found to be 0.79, and it can be said that the analysis was reliable because this value was higher than 0.70 according to Miles and Huberman (1994).

FINDINGS

According to the findings obtained in line with the purpose of the research, the findings regarding the pre-service primary school teachers' realization of RME activities are given in Figure 1.

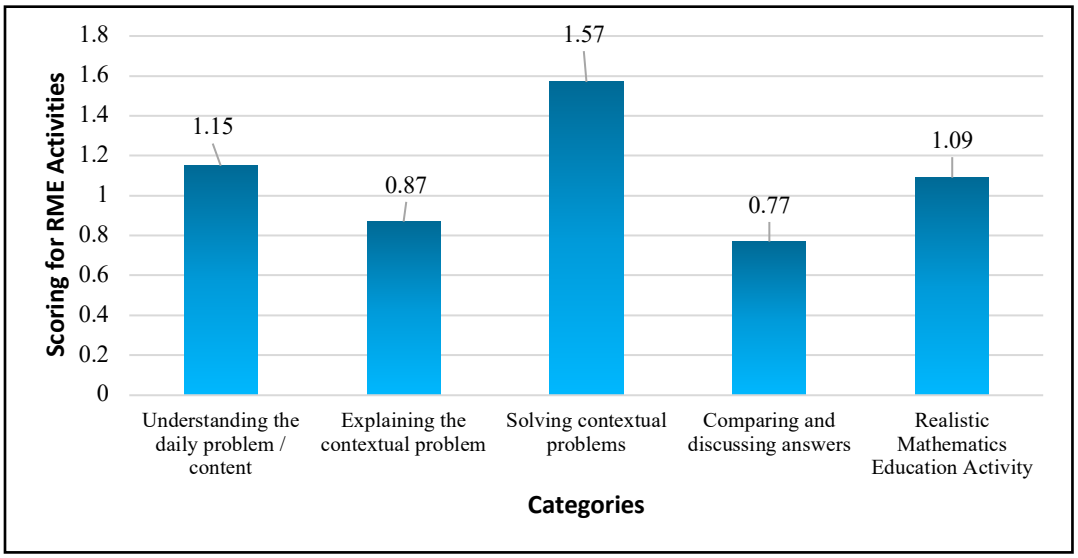

Figure 1. Average scores of pre-service primary school teachers regarding RME activities

When the situations of preparing the RME activities of the pre-service primary school teachers in Figure 1 are analyzed, it is seen that the RME activity score average ($\bar{X}$=1.09) is at the "medium" level. It was determined that the mean score of "understanding the daily problem/content" ($\bar{X}$=1.15), and the mean score of the "solving contextual problems" dimension ($\bar{X}$=1.57) is at a "high" level. From this point of view, it can be said that pre-service primary school teachers use contextual problem solving more frequently in the RME activities they prepare.

The findings regarding the dimension of "understanding the daily problem/content" in the RME activities prepared by the pre-service primary school teachers are given in Figure 2.

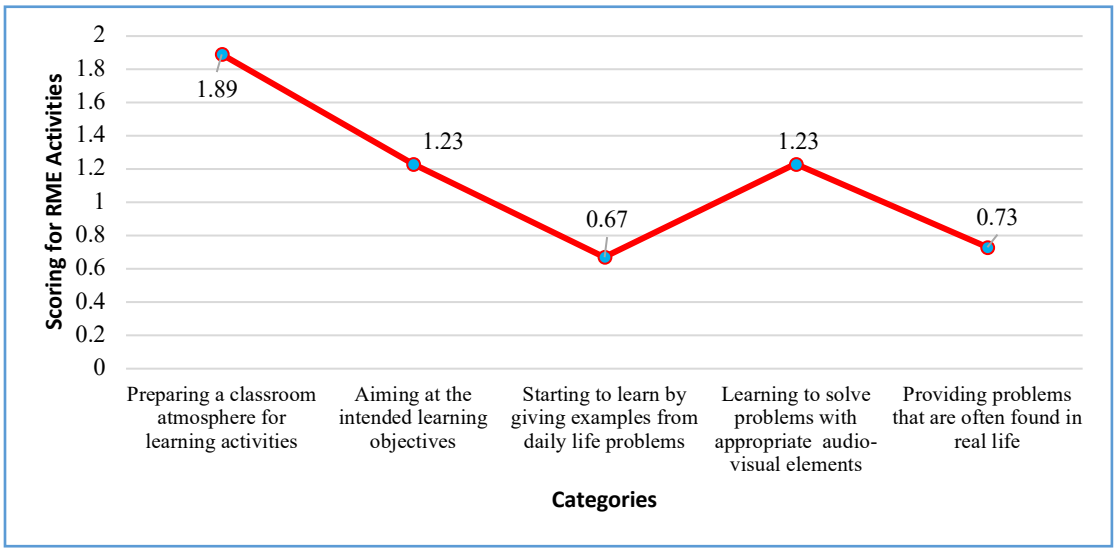

Figure 2. The average scores of the pre-service primary school teachers regarding the dimension of "understanding the daily problem/content" in RME activities

In Figure 2, it is seen that the item "preparing a classroom atmosphere for learning activities" ($\bar{X}$=1.89) in the dimension of "understanding the daily problem/content" in the RME activities prepared by the pre-service primary school teachers has the highest average score. It was determined that the item "starting learning by giving examples from the problems in daily life" ($\bar{X}$=0.67) had the lowest average score. It can be said that pre-service primary school teachers reflect a classroom environment that can provide learning activities to their activities. However, it can be stated that pre-service primary school teachers who prepare RME activities have difficulty in reflecting on their activities to initiate the learning process by giving problems from daily life.

The findings regarding the dimension of "explaining the contextual problem" in the RME activities prepared by the pre-service primary school teachers are given in Figure 3.

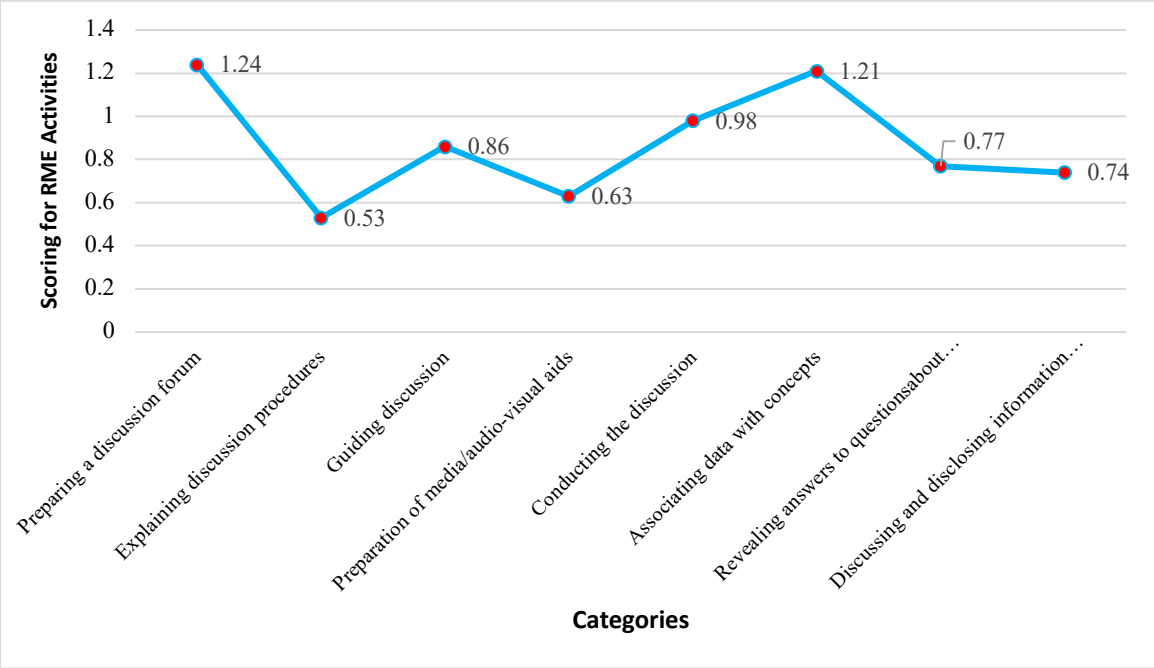

Figure 3. The average scores of the pre-service primary school teachers regarding the daily "explaining the contextual problem" dimension in RME activities

In Figure 3, it is seen that the item "preparing a discussion forum" ($\bar{X}$=1.24) in the dimension of "explaining the contextual problem" in the RME activities prepared by the pre-service primary school teachers has the highest average score. It was found that the item “explaining the discussion procedures” ($\bar{X}$=0.53) had the lowest average score. It can be said that the pre-service primary school teachers include discussion in the activities they carry out, and they cannot reveal the procedure for how these discussions will be conducted.

The findings regarding the dimension of "solving contextual problems" in the RME activities prepared by the pre-service primary school teachers are given in Figure 4.

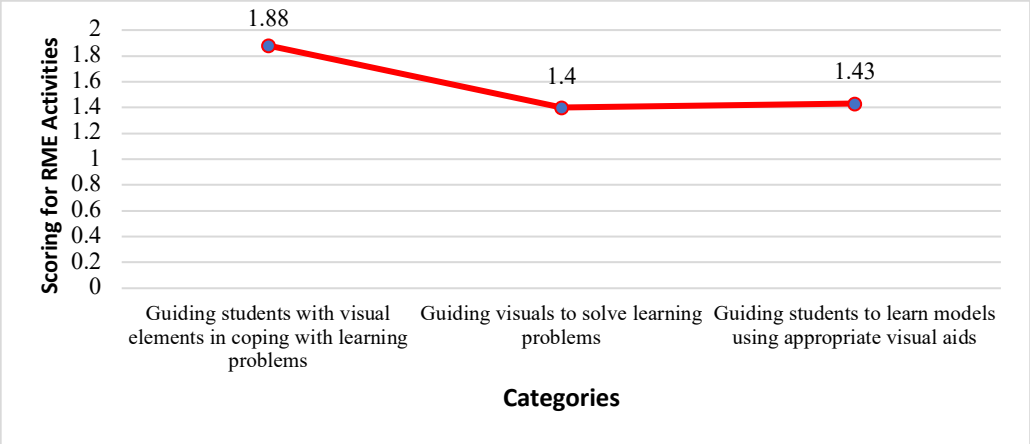

Figure 4. The average scores of the pre-service primary school teachers regarding the daily "solving contextual problems" dimension in RME activities

In Figure 4, it is seen that the item "guiding students with visual elements in coping with learning problems" ($\bar{X}$=1.88) in the dimension of "solving contextual problems" has the highest average score in the RME activities prepared by the pre-service primary school teachers. The item "guiding visuals to solve problems in learning" ($\bar{X}$=1.40) has the lowest average score. As a result of this finding, it can be said that pre-service primary school teachers are guiding students by using visual elements in solving contextual problems in the RME activities they prepare. However, it can be said that the pre-service teachers do not direct students to use the visuals used to solve the problem in their activities, and it can be said that a deficient situation can be created for the students.

The findings regarding the dimension of "comparing and discussing the answers" in the RME activities prepared by the pre-service primary school teachers are given in Figure 5.

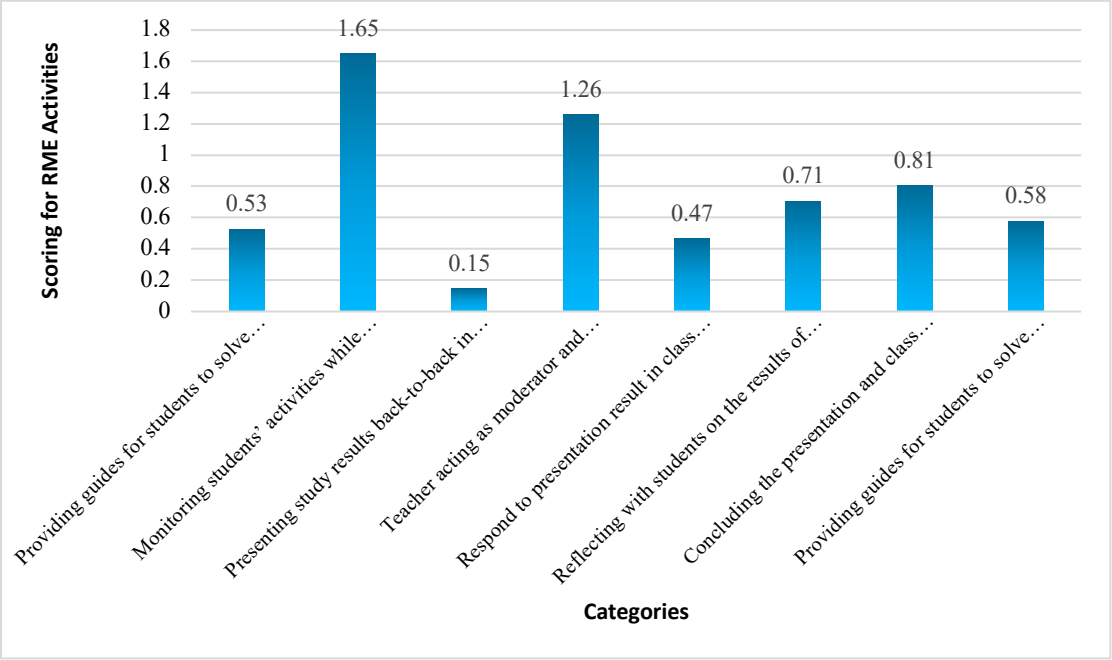

Figure 5. The average scores of the pre-service primary school teachers on the daily "comparing and discussing answers" dimension in RME activities

In Figure 5, it is seen that the item "monitoring students' activities while solving problems" ($\bar{X}$=1.65) in the dimension of "comparing and discussing the answers" in the RME activities prepared by the pre-service primary school teachers has the highest average score. It was determined that the item "presenting the results of the study in mathematics education consecutively in the classroom" ($\bar{X}$=0.15) had the lowest average score. As a result of this finding, it can be said that the pre-service primary school teachers closely followed the students' activities in comparing and discussing the answers in the RME activities they prepared and stated this situation in their activities. In addition, it is seen that they are insufficient in presenting the results of the study conducted in the classroom while the mathematics learning takes place in the written activities.

DISCUSSION

In recent years, with the adoption of the constructivist approach in education, the importance of the RME approach in mathematics has increased in terms of enabling the transition to a more constructive and open-minded attitude. In the study, the activity plans prepared by the pre-service primary school teachers for natural numbers and operation learning areas suitable for the second

grade level of primary school were analysed. While analysing the RME activities prepared by the pre-service teachers, it was expected to see the traces of the constructivist approach. In this direction, when the RME activities scored under the dimensions of understanding the daily problem/content, explaining the contextual problem, solving the contextual problems, comparing the answers and discussing were analysed, it was determined that the activities prepared by the pre-service primary school teachers were generally at a medium level in terms of compliance with RME. In addition, it can be said that the RME activities prepared by the pre-service primary school teachers are at a higher level in the contextual problem solving category than in other categories. From a constructivist perspective, mathematical concepts are expected to be contextual, as they arise from human activities in a particular context. According to Arsoetar and Sugiman (2019), an approach using contextual problems is required to construct students' mathematical knowledge (Arsoetar & Sugiman, 2019). Considering the constructivist approach, contextual problems are affected by the social environment in the learning process. In this study, it can be said that pre-service teachers' use of problems in the context of daily life in RME activities is one of the most effective reflections of the constructivist approach.

When the category of "understanding the daily problem/content" in the RME activities prepared by the pre-service primary school teachers is analysed, it can be said that the participants reflect a classroom environment that can provide learning activities to their activities. However, it was determined that they could not reflect on their activities to initiate the learning process by giving examples of problems from daily life. In this case, it shows that there are problems in establishing context in the teaching process and that mathematization cannot be done. In addition, it has been seen that the pre-service teachers are not sufficient in the stage of using real-life problems frequently. However, the contextual problems used in RME need to be both realistic and based on the context of daily life. Therefore, the establishment or preference of problems suitable for RME forms the basis of the lesson. Thus, students can find their own answers to real-life problems, and students can develop and apply their knowledge by discussing the results of their answers with their peers (Sholikhah & Rasmita, 2020). In other words, knowledge must be made into a real life situation. Therefore, it is of great importance to use daily life problems both for RME and for the constructivist approach. This situation can also be explained by the principle of relative to the student and the principle of near to far in teaching principles.

Explaining the problem to the students regarding the problem given in the RME activities was included in the category of "explaining the contextual problem". In this category, it was observed that although the pre-service teachers prepared discussion forms, they could not present the procedure and media / audio-visual materials on how to conduct discussions in these forms. Discussion and reflection play an important role in supporting student development. It is important for students to share their ideas with each other. This is also one of the requirements of the constructivist approach. In the report presented by Searle and Barmby (2012), many teachers stated that it is acceptable for students to express wrong ideas and conflicts arise, and that discussion

plays an important role for them. In addition, students can reveal their misconceptions in the solved problems by explaining their strategies to each other through discussion. Therefore, while preparing activities suitable for the constructivist approach, teachers should organize the classroom and classroom environment so that classroom discussions can be held. However, in the study, it was seen that the pre-service teachers could not put forward the procedure and media / audio-visual materials on how to conduct the discussions. It is necessary to support the problem and discussions with audio-visual materials in order to concretize the given problem and make it more understandable. The activities prepared in accordance with RME should be shown with multiple representations in the form of visual, auditory, verbal and media, and should be used continuously by the teacher as an alternative to improve the quality of mathematics learning at school (Muhtarom, Nizaruddin, Nursyahidah & Happy, 2019).

In the RME activities they prepared, pre-service primary school teachers provide the opportunity for students to determine their own methods by directing the problem-solving phase to cooperation in the "solving contextual problems" phase, valuing different ways, studying on problems at different levels, RME's vertical mathematization tool (use of the model) and being relevant to the subject (the use of the relationship) are important in terms of reflecting its characteristics. In this category, it was observed that although the pre-service teachers used visual elements to solve problems, they did not support the students to use visual materials on their own. However, in the constructivist approach, the teacher should provide rich learning environments and provide students with the opportunity to test the accuracy of the information they have previously constructed in their minds, correct their mistakes, and even create their own models by giving up their previous knowledge and replacing it with new ones (Yaşar, 1998). Similarly, in RME, students should be given the opportunity to use and develop their own materials and models in the problem-solving process.

As the last dimension of the activities analysed, in the category of "comparing and discussing the answers", the process of making use of students' contributions and interaction between students was analysed, as well as skills such as facilitating discussion and comparing and discussing the answers to the problems in groups. It was observed that the pre-service teachers closely followed the activities of the students and stated this in their activities. In addition, it has been revealed that they are inadequate in presenting the results of the study done while learning mathematics in the written activities, evaluating the results of the presentations made according to the planned discussion forms, and guiding the students to solve the problems based on their own experiences. Both the RME and the constructivist approach emphasize the guided rediscovery process (Gravemeijer, 2020). For this reason, considering the results obtained, it can be said that the constructivist approach that shapes the education process of pre-service teachers is insufficient at this stage of preparing RME activities.

CONCLUSION

RME and constructivist approach emerged as a challenge to traditional education. Although the constructivist education approach has been implemented in Turkey since 2005, the RME approach has remained only at the research and examination stage. The pre-service primary school teachers participating in the research started primary school in 2005. This shows that pre-service teachers receive education in accordance with the constructivist approach from primary school. On the other hand, the first encounter of pre-service teachers with RME was in the third year of university. This situation made us think that those who train pre-service teachers are still not able to get out of the traditionalist understanding.

Unfortunately, this study did not include a specific discussion on possible strategies to address the issue of deplorable practices of in-service teachers. However, based on the findings of the study, the authors could suggest some potential strategies that may be helpful.

- First, it may be useful to provide additional training and professional development opportunities for in-service teachers on the RME approach, particularly in terms of preparing contextual problem-solving activities and incorporating daily life problems. This can help improve their understanding and implementation of the RME approach in their classroom teaching practices.
- Second, it may be helpful to establish a mentorship program for in-service teachers where experienced RME practitioners can mentor and support less experienced teachers in their implementation of the RME approach. This can provide opportunities for collaboration, reflection, and continuous learning for both mentors and mentees.
- Third, it may be useful to create a community of practice for RME teachers where they can share resources, ideas, and experiences with each other. This can help create a sense of shared responsibility and commitment towards improving the quality of math education and promoting the use of RME practices.

In conclusion, these strategies, as well as others, may be helpful in addressing the issue of deplorable practices of in-service teachers and promoting the use of the RME approach in math education.

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