



# Early Childhood Mathematics Learning in Realistic Mathematical Education (RME)

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**Abstract.** Mathematics is an ability that is used in everyday life in all aspects of age. The competence of mathematical abilities is important for every individual so that it must be introduced from an early age. This study aims to describe empirically early childhood mathematics learning in Realistic Mathematical Education (RME). This research is a qualitative research with a literature study approach. The findings show that: Mathematical ability is the main thing as a provision to live daily life so that mathematics must be introduced from an early age. Mathematics is closely related to the ability to think and is indispensable in all daily activities. In building mathematical knowledge in children, learning mathematics to be taught should be done in a fun way and using the simplest things that are close to the child's life and are realistic. Realistic Mathematical Education is a practical solution in making mathematics learning more meaningful, engaging and fun. In the application of Realistic Mathematical Education, it is not only a provision in carrying out all activities in life but also can improve children's skills in solving problems and thinking critically. Furthermore, the correct mastery of mathematical concepts from an early age will contribute optimally to learning mathematics at higher levels of education.

**Keywords:** Mathematics Learning · Early Childhood · Realistic Mathematical Education (RME)

## 1 Introduction

Mathematical ability becomes a competency and is an ability that is closely used in everyday life. Mastery of mathematical concepts from an early age will contribute optimally to learning mathematics at higher education levels. This is important to note because in fact what is happening in Indonesia is the concept of mathematics is still a real problem. From the results of the 2018 Program for International Student Assessment (PISA) survey published in March 2019 that in reading, science and mathematics, Indonesia is in a low position, it is known that Indonesia ranks 74th out of 79 countries. Indonesia experienced a decline from rank 64 in 2015 to rank 74 in 2018. Furthermore, in the mathematics category, Indonesia was in the position of rank 63 in 2015 and decreased to rank 73 in 2018 [1]. In other words, from year to year the mathematical ability of children in Indonesia has decreased, meaning that Indonesia is still below the average

compared to other countries in the world. Based on the results of the PISA survey, it can be interpreted that children's mathematical abilities need to be improved to prepare children to enter higher education levels and make mathematics a part of children's daily lives.

Mathematics is the ability to recognize numbers which is a useful competency in everyday life. The importance of this number recognition competence must be introduced from an early age. Mathematics is very closely related to the ability to think and develop the ability of children's thinking patterns. The problem of mathematics in early childhood is the lack of children in recognizing concepts due to abstract teaching, while the developmental achievement that is expected to be achieved by children is the introduction of the concept of numbers in a concrete way. Therefore, learning mathematics for children should be done in a fun way and using simple things that are close and popular with early childhood. As the nature of early childhood, building knowledge is carried out through play activities so that children do not realize that the games they are playing are learning mathematics [2–5]. In the introduction of mathematics for early childhood, appropriate learning media are needed so that learning is more relevant so that the maturity of children's mathematical abilities can increase to the maximum, this will be useful for building the initial foundation for learning mathematics in children.

Learning mathematics from an early age is one way to train children's ability to think logically and systematically, as well as stimulate thinking skills to have readiness in learning mathematics at a further stage. The indicators of the dimensions of mathematical calculations are that the child is able to: (1) recognize the sequence of numbers, (2) count/count the number of objects, (3) recognize the concept of adding and subtracting, (4) comparing the number of objects, and (5) measuring objects/objects [6, 7].

Realistic Mathematical Education is learning that uses the real world as a starting point in the development of mathematical ideas and concepts. This approach offers children the opportunity to manipulate real objects or props. The use of a realistic mathematical education approach to improve mathematical connection skills in early childhood has contributed to improving student learning outcomes and making learning more meaningful [8, 9].

## 2 Methodology

This study uses a literature review with a qualitative research approach through data collection based on scientific articles related to research variables. The method of data collection is done through the literature review method. There are four steps that guide the literature review, namely: (1) searching for literature, (2) assessing literature, (3) systematically examining and analyzing literature content, (4) synthesizing literature content [10] (Fig. 1).

Literature review aims to summarize, analyze, and interpret concepts and theories related to a study [11]. The literature review conducted in this study focuses on study materials that are specifically focused on the research subject being studied, namely those related to early childhood mathematics and realistic mathematics education (RME).

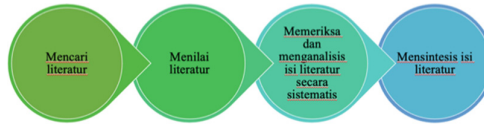


Fig. 1. Steps for Literature Review

### 3 Results and Discussion

Mathematics learning techniques using Realistic Mathematics Education provide maximum contribution to the development of mathematics in early childhood. Apart from this, other factors, such as gender, age and nonverbal cognitive abilities, did not differentiate the development of children's mathematical competence [12]. Mathematical concepts in early childhood are found every day through their playing experiences. Distributing food to family members, pouring water into plastic containers, following the pattern of clapping and singing to recognize numbers. A learning approach that can use a concept like this is PMRI, namely Indonesian Realistic Mathematics Education which starts learning from daily experiences and activities [13].

Realistic mathematics education is one of the alternative learning approaches that can be chosen to improve learning outcomes, because this approach will be able to bridge the abstract mathematics learning process to be easy and useful. The results showed (1) the activity of understanding the concept of numbers and their learning in PAUD while using PMR was categorized as very good, which was shown by the results of observations in the very good category (88% category A) and (2) The learning outcomes of understanding the concept of numbers and their learning in PAUD before using PMR has made very good progress, which is shown in the work on the assignment sheets being answered correctly [8]. Increasing numeracy skills using the Realistic Mathematical Education approach forms students based on the real world as concrete objects in knowledge. After being given action by applying the Realistic Mathematical Education approach, students' numeracy skills have increased [9].

Mathematics grows and develops from everyday life, therefore learning mathematics must be able to interact in real life. PMR can bridge the abstract nature of mathematics to be more real and useful. The results of the study were: (1) The two subjects before showing showed low mathematical connection abilities; (2) Learning activities with the PMR approach are effective for improving the mathematical connection skills of research subjects; and (3) The second condition after being given the Realistic Mathematics Education (PMR) approach showed the ability to connect mathematics was in a very good category. In general, it can be said that PMR has improved student learning outcomes and made learning more meaningful [8]. Mathematical reasoning is a cognitively challenging activity for children, this needs to be given both from kindergarten to college. However, there are children who experience mathematics. RME can be a solution for consideration to be applied in the mathematics learning process because it not only affects children's mathematical activities at school but also in children's daily lives [14–16].

RME has become an international concern through curriculum development and focus on implementing RME in mathematics learning activities for children, will have a major impact on children's learning outcomes. RME supports children's learning of

mathematics in a more meaningful way teachers can prepare a meaningful learning environment for children. RME makes a significant contribution to the development of children's mathematical abilities [12, 17, 18]. Through the application of RME in children, they produce a positive and fun learning environment. This positively affects learning outcomes, achievement levels, children's activeness and children's critical thinking skills so that children's mathematical abilities improve better. RME makes children feel happy in solving problems both individually and in groups [11, 17, 19].

Realistic mathematics learning model affects the knowledge of recognizing the concept of numbers in children because realistic mathematics learning models can help children in thinking concretely towards abstract in addition, with realistic mathematics learning models can provide opportunities for children to explore to build their own knowledge through objects that are realistic in accordance with the daily life of the child and close to the child's environment, so that the child becomes more active and learning activities are more meaningful and the child's ability to recognize the concept of numbers develops in accordance with expectations [20]. A realistic mathematics education approach as an approach to learning mathematics is certainly a good approach to apply to students, from kindergarten to university. This Realistic Mathematics Education (PMR) approach focuses on realistic concepts where students are able to understand material with examples and questions, and can imagine and illustrate mathematics learning materials related to everyday life [21]. The application of a child-friendly realistic learning model shows the practicality of the RME model is very good for use in children and teachers are able to manage mathematics learning well and fun [22]. RME makes mathematics learning more meaningful in completing mathematics learning and is able to improve mathematical problem solving abilities and increase children's independence in learning activities. Learning activities require realistic mathematical concepts so that mathematics learning activities for children are more optimal [23–25].

## 4 Conclusion

The importance of mathematical abilities must be introduced from an early age because mathematics is closely related to thinking skills and is indispensable in everyday life. Learning mathematics for children should be done in a fun way and using simple things that are close to the lives of early childhood so that the maturity of children's mathematical abilities can increase to the maximum, this will be useful for building the initial foundation of learning mathematics in children. Learning mathematics from an early age is one way to train children's ability to think logically and systematically, as well as stimulate thinking skills to have readiness in learning mathematics at a further stage. Using a realistic mathematical education approach that presents real things in its implementation is a starting point in the development of mathematical ideas and concepts. This approach offers children the opportunity to explore and manipulate the media used. The use of a realistic mathematical education approach in learning mathematics in early childhood will improve children's mathematical abilities and make learning more meaningful.

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