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The Effect of Mathematics Learning Approaches and Self-Regulation to Recognize the Concept of Early Numbers Ability

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ABSTRACT: The ability to recognize the concept of early numbers in early childhood is very important to develop so that children are ready to take part in learning mathematics at a higher level. This study aims to determine the effect of mathematics learning approaches and self-regulation to recognize the concept of early numbers ability in kindergarten. The study used an experimental method with a treatment design by level 2x2. The sample used was 32 children. Score data, ability to recognize number concepts, analyzed and interpreted. The results showed that: (1) The Realistic Mathematics Education approach is better than the Open Ended Approach in improving the ability to recognize children's number concepts; (2) There is an interaction effect between mathematics learning approaches and Self-Regulation to recognize the concept of early numbers ability; (3) The Realistic Mathematics Education approach is more suitable for children with high self-regulation, (4) The Open Ended approach is more suitable for children with low self-regulation. Subsequent experiments are expected to find mathematics learning approaches for children whose self-regulation is low on recognizing the concept of early numbers ability.

Keywords: mathematics learning approach, self-regulation, early number concept ability

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1 INTRODUCTION

Mathematics is a branch of science that is universal, so it has a very important role in shaping the character of students and the development of their thinking skills (Amalina, 2020). The development of other knowledge will not be difficult for students if mastery of mathematics is mastered well, because various abilities have been honed such as the ability to think critically, creatively, logically, and systematically, and the ability to work together (Aziza et al., 2020). The hope that becomes the essence after learning mathematics is that students can apply mathematics to their daily lives. A study says that good mastery of mathematics from an early age will be positively correlated with the ability to withstand the social environment (Elliott et al., 2016)

In teaching more complex mathematical skills, mathematics teaching has begun to be introduced from an early age. One part of the basic ability to learn mathematics from an early age is the ability to recognize the concept of numbers (Utoyo & Arifin, 2017). The ability to recognize the concept of numbers is part of the ability to think symbolically in aspects of cognitive development of children aged 4-5 years which is clearly stated in Ministerial Regulation, Number 137 of 2014 (Pendidikan et al., 2014). Children's ability to recognize the concept of numbers is a strong starting ground so that children can master and understand higher mathematics learning (Shah et al., 2018). Some of the results of previous research studies stated that there are benefits from the development of the ability to recognize number concepts from an early age, such as developing the ability to recognize numbers, mention numbers, compare numbers, and calculations (Yilmaz, 2017), there is a connection from learning numbers with the addition of children's vocabulary (receptive and expressive) (Sarnecka & Lee, 2019), the provision of symbolic and non-symbolic programs has a positive effect on increasing the ability to recognize numbers and arithmetic in preschool-aged children (Van Herwegen et al., 2018), knowledge of numbers has a positive impact on children's arithmetic abilities (Östergren & Träff, 2013).

Previous research has also stated that mastery of number concepts will have a major impact on the acquisition of mathematics results at the next level of education. Such as mastery of number concepts in kindergarten is a strong predictor for third-grade students in the matter of calculating numbers and solving mathematical problems (McGuire et al., 2012). Other research states that good early childhood ability to sequence numbers is positively correlated to early math skills, influences mature math performance, and continues significantly to the first and second-grade students' math skills to grow and develop well (O'Connor et al., 2018). The abilities possessed by children do not necessarily develop just like that, but there needs to be stimulation from the surrounding environment, namely by applying the approaches, methods, and learning strategies used by the teacher.

Many studies state that there is a significant child's ability to recognize the concept of numbers correlates to children's skills in the future and has a major impact on aspects of child development. However, the achievement on the contrary is an unhappy result of the

acquisition of Indonesian children's mathematics scores in the publication conducted by the Program for International Student Assessment (PISA) in 2018 Indonesia is at the lower level, which is ranked 72 out of 79 countries (Deny, 2019). From this data, other results in the Trend in International Mathematics and Science Study (TIMSS) state that the ability of Indonesian students in science and mathematics, especially in the ability to conceptualize numbers, is also at the bottom, namely ranking 45 out of 50 countries (Mullis et al., 2015). Other data sources obtained from the Ministry of Education and Culture of the Republic of Indonesia stated that the ability level of elementary school students in mathematics was only 95% capable of reaching the middle level while neighboring countries such as Singapore were able to reach 40% at a high and advanced level so that Indonesia (Jampel & Puspita, 2017). Furthermore, research on Assessing the Number Sense Performance of Indonesian Elementary School Students states that as many as 23.53% - 49.75% of elementary school students are still weak in understanding the concept of numbers and meaning, especially in the realm of fractions and decimals (Purnomo et al., 2014). The weak ability of Indonesian students needs to be analyzed in terms of what factors are the cause.

This fact is in line with findings in the field that the ability to recognize the concept of numbers that should be achieved by group A children in several Kindergartens/PAUD/SPS in Batusangkar City is still far from expectations. Report on the results of the child's development at the end of the semester in the ability to recognize the concept of numbers as much as 60% is still in the Start of Development (MB) criteria. Among the problems that arose during the observation was that the child was still confused about mentioning the numbers 1-10, which the teacher asked for. Some children have not been able to count numbers from big to small. In addition, children just don't understand the concept of the number of numbers. Factors causing the non-optimal learning of the number concept are due to the lack of support for the variety of media used by the teacher when teaching, only in the form of blackboards, number posters, and worksheet books. Also, teachers pay less attention to the maturity of each child. In addition, various approaches, strategies, and the latest methods of learning mathematics are also not updated so learning looks monotonous, and many children do not pay attention to the teacher when learning mathematics in class. The results of further observations, children's self-regulation also becomes a part and a supporting factor so that the ability to recognize the concept of children's numbers develops.

This was also confirmed by Rakhman and Alam (2022) stating that in general teachers in the class were less creative in creating a warm learning atmosphere because they tended to use lecture and expository methods which resulted in children's mathematical thinking abilities not developing properly. This is also supported by Nabighoh et al., (2022) mentioning the impact of learning that is too teacher-centered so that it is difficult for children to understand the concept of learning mathematics meaningfully. The learning process for all levels requires teachers to be more creative, especially at the Early Childhood Education (PAUD) level, because early childhood still has a concrete way of thinking and has not yet realized the meaning of learning. Therefore, the teacher's skills

in making learning objectives, choosing material, determining approaches/methods/media, carrying out learning, and developing evaluation tools are very necessary.

As stated by Sriwahyuni et al., (2017) that there are differences in students in various ways, especially in their abilities, the teacher must be able to choose a learning approach that is by the goals to be achieved, the characteristics and age of the students. The approach chosen for early childhood to introduce the concept of numbers must be meaningful, and fun so that children understand (Muzakki & Fauziah, 2015). This statement implies that choosing an effective, meaningful, and enjoyable learning approach will lead students to like mathematics from an early age so that it will bring out their enthusiasm for learning in the classroom.

One approach that can be used in teaching the introduction of mathematical concepts in kindergarten is the Realistic Mathematics Education (RME) approach and the Open Ended (OE) approach. Learning the RME approach is known as learning based on contextual problems in the implementation process. This learning approach and its implementation in learning mathematics are emphasized in line with the curriculum (Handayani & Irawan, 2020). The results showed that there was a significant influence between learning mathematics and RME on students' conceptual understanding and logical thinking and conceptual understanding (Widyastuti & Pujiastuti, 2014). Other research also mentions that the mathematics learning approach provided by RME can also have a significant effect on children's ability to recognize the concept of whole numbers (Adjie et al., 2019, 2021; Liwis & Antara, 2017), improve mathematical connection skills (Adjie et al., 2020), can improve mathematics learning outcomes (Narayani, 2019).

While the Open Ended (OE) approach is an approach that starts from a perspective with efforts that can be made in evaluating students' abilities objectively (Sutama et al., 2021). The implementation of this OE approach begins by confronting and introducing children to open problems. Through this OE approach, children are more active in learning to express their ideas, provide great opportunities for children to build a comprehensive construction of mathematical knowledge, and enable children with low abilities to respond to problems in their way (N. R. Utami & Warmansyah, 2019). The OE approach can also provide benefits in intrinsically motivating children in explaining the problems given so that children get their own experience in finding and answering problems. The results of other studies state that learning with the OE approach can train students so they can practice cooperation to solve the problems presented by the teacher (Rohmalina et al., 2020). In addition, the OE approach and the RME approach are also expected to be able to help children solve problems in recognizing mathematical concepts, especially problems with number concepts.

In addition to the mathematics learning approach used by the teacher in supporting the development of the ability to recognize children's number concepts, other factors are also influential, such as children's skills to be able to control themselves and adapt, which is known as self-regulation. A study stated that self-regulation has a positive relationship

with children's executive function and children's emotional control at preschool age (Brandes-Aitken et al., 2019). Other research also states that children who have good self-regulation will be seen from behavioral adjustments, for example, children will be attentive during mathematics learning in class (Deflorio et al., 2018). It also shows an increase in attention, literacy, and math skills in early school (Sawyer et al., 2015). Therefore, for children with high self-regulation, it will have a good impact on the children themselves, especially children who can control their behavior emotions, actions, and concentration of attention so that it will enable children's involvement in every class activity.

From previous research, the provision of a mathematics learning approach influences increasing the ability to recognize the concept of numbers and self-regulation as an internal factor in bridging this influence. Therefore, even though there have been previous research studies, no research has been found that examines the extent to which the influence of the RME and OE mathematics learning approaches improves the ability to recognize children's number concepts as seen from the high and low categories of children's self-regulation. So that the research results are updated in the form of which approach is more suitable for increasing the ability to recognize the concept of numbers for children who have high and low self-regulation.

The purpose of this study was to find out differences in the ability to recognize the number concept in group A children who were given the RME mathematics learning approach and those who were given the open-ended mathematics learning approach. The interaction between the mathematics learning approach and self-regulation on the ability to recognize number concepts in group A children. Providing learning approaches that are suitable for children with high regulation so that the ability to recognize the concept of numbers can increase. Providing learning approaches that are suitable for children with low regulation so that the ability to recognize the concept of numbers can increase.

2 THEORETICAL STUDY

2.1 *Ability to Recognize the Concept of Early Numbers in Early Childhood*

One of the abilities that must be developed in a child is to recognize the concept of numbers (C. Mulyati et al., 2019). Mathematics education in early childhood is a very important thing to pay attention to, especially at this time, one of which is the ability to recognize the concept of numbers (Amini et al., 2022; Jennifer et al., 2014; Rosdiani & Warmansyah, 2021; Wulandani et al., 2022). The ability to recognize the concept of numbers is a beginning math skill (Haryuni, 2013; S. Mulyati & Sisrazeni, 2022; S. Y. Utami et al., 2023; Warmansyah et al., 2022). Early experience with numbers and operations is essential for acquiring more complex mathematical concepts and skills (Frye et al., 2014). Numbers are symbols that never escape from our daily lives, every activity that is carried out mostly uses numbers as symbols used (Roliana, 2018)). For example, when a child makes tea or milk, then to measure the amount of sugar or milk used, you must use numbers to measure it, "two" spoons of sugar or "one" spoon of milk.

Chomsky and Hurford 1987 said that the ability to recognize the concept of numbers is considered to come from human linguistic competence, the ability to recognize the concept of numbers is the core of every ability we have, be it the ability to read, write, produce, or understand numbers (Zhou & Yadav, 2017). In knowing the concept of numbers, two things cover it, namely rote counting and rational counting (Charlesworth, 2005). Rote counting is the ability to name numbers that have been stored in memory sequentially (Mclaughlin et al., 2013). An example is a child counting from one to ten smoothly without making any mistakes. Rational counting is the ability to label several objects around them with sequential numbers (Fathonah, 2021). For example, the first object a child sees will be named or labeled with the number one, then the second object will be labeled with the number two, and so on.

Another opinion regarding the ability to recognize the concept of numbers in early childhood is that numbers and operations are an understanding of the concepts of numbers, sequences, amounts, labeling with numbers, one-to-one correspondence (that one object corresponds to one number), and counting (Greenberg, 2012). The introduction of numbers or the concept of numbers to children will further help the child's reasoning power more optimally if the introduction of the concept of numbers uses concrete examples (Sudono, 2000). The opinion of Griffin and Case (1997) in McGuire et al., (2012) regarding the ability to recognize the concept of numbers in early childhood is (1) Counting (2) Number Knowledge (3) Number Transformation (4) Estimation (5) Number Patterns. The ability to recognize the concept of numbers in children is also marked by the child's ability to recognize larger and smaller numbers. This can be seen from the ability to (1) recognition of small numbers, (2) Counting of meaningful objects, (3) Count-based comparisons of collections larger than three, (3) After-number knowledge, (4) Mental comparisons of numbers that are close or close together (Ivrendi, 2011).

2.2 *Mathematics Learning Approach*

The approach to learning mathematics is a series of planned or organized actions by certain existing principles (e.g. philosophical foundations, didactic principles, psychological principles, or ecological principles), which are directed systematically at the goals to be achieved (Syah, 2003). In this way, patterns of action can be built on proven principles so that organized actions can work consistently toward achieving goals. The mathematics learning approach is the method taken by the teacher in implementing learning so that the concepts presented can be easily understood by students (Zulkarnain & Amalia Sari, 2016). There are two types of approaches to learning mathematics, namely methodological approaches, and material approaches. Suseno et al., (2020) state that the mathematics learning approach is a process that is designed to form a learning environment that allows a (student) to carry out mathematics learning activities and a learning process centered on the teacher who teaches mathematics. The approach to learning mathematics is the method taken by the teacher in the application of mathematics learning so that the concepts presented can be understood by students (Narayani, 2019).

One well-known approach to learning mathematics is the realistic approach (realistic mathematics education) (Hidayat et al., 2020). This realistic approach is a theory in mathematics learning that was first developed in the Netherlands in 1970. The realistic approach was introduced in Indonesia in 2001 in several universities collaboratively through an elementary school-level realistic mathematics education project. Learning using a realistic approach emphasizes the importance of a concrete context that is known to students and the process of constructing the students' own knowledge (Evi, 2011).

The construction of mathematical knowledge in students must pay attention to the real context that takes place in the learning process. Mathematics must be related to the life of every human being and mathematics is part of every human activity. So, mathematics must be close to the lives of students and in sync with their daily lives (Ningsih, 2014). The early stages of compulsory learning correspond to concrete experiences for students (Cobb et al., 2008). This effort is carried out by exploring various realistic situations and problems. Realism does not have to refer to something empirical, but what is required is synchronization with the thoughts (Hidayat et al., 2020).

In its application during the learning process in the classroom, this realistic approach pays close attention to informal aspects and then leads students' thinking toward the formal mathematics (Wijaya, 2011). Several characteristics can be considered in realistic mathematics learning, namely: 1) using contexts that are appropriate to the real world, 2) using mathematical models, 3) prioritizing student production and contribution, 4) interactive, and 5) depicting relationships (Nurlatifah et al., 2017). The use of real-world contexts in the learning process begins with contextual problems (real world), thereby enabling students to make exclusive use of previous experience in the use of mathematical models related to situational models and mathematical examples developed by students themselves (self- develop model) (Putra, 2014). The role of self-developed models is a bridge for students to change situations from real to abstract situations, or it can be called from informal mathematics to formal mathematics, which means students produce their models in solving problems they encounter (Wulandari et al., 2020).

In the production and contribution of students, it is emphasized that students contribute the most to the learning process and provide understanding in themselves. Using interactive, namely interactive between students and teachers means the basis for a realistic approach (Dwipayana & Diputra, 2019). Explicit forms of interaction are in the form of negotiations, explanations, justifications, agreement decisions, disagreements, questions, and answers or reflections that are used to achieve the informal form of students. In the description, the integration of mathematical units is very fundamental. If in learning we interact using other fields, it will affect problem-solving in the mathematics (Yanti et al., 2018). A realistic approach can be implemented if the learning design has realistic goals, the material used is based on real and contextual contexts, activities between teachers and students must be equally dominant, and the evaluation used can be in the form of questions that provoke reasoning from the student (Handayani & Irawan, 2020).

Another approach is known as the open-ended approach. Rohmalina et al., (2020) said that the open problem approach is an approach that uses teaching methods in which the activities and interactions between mathematics and students have many variations. The open problem approach is an approach that can awaken students' logic which can cause students to be creative and able to think logically and critically. Nurlita (2015) also said that the purpose of developing learning using this open-problem approach is to help develop the creativity of students and their ability to think mathematically in solving problems. In addition, in using this approach each student has the freedom to solve existing problems according to their abilities and interests.

Students with higher abilities can take part in the process of learning mathematics and students who have low mathematical abilities can still enjoy math activities, because students are required to work according to their creativity and according to their abilities (Nurina & Retnawati, 2015). This is the main goal in implementing learning with an open problem approach, namely learning that builds interactive activities between mathematics and students to invite students to respond to conflicts through various tactics. Meanwhile, according to Mustikasari et al., (2013) the open problem approach is one approach that can awaken students' reasoning so that students are creative and ultimately students can think logically and critically.

2.3 *Self-Regulation*

The success of learning activities can be seen from the child's response to learning activities. In addition to learning approaches, other things can support children's abilities, one of which is that children have good self-regulation abilities. Judging from the child's ability to socialize, good self-regulation abilities help children to be able to adapt and be accepted by the environment around them (Oktaviana et al., 2021; Ponitz et al., 2009; Rahma & Haviz, 2022; Safitri et al., 2023; Warmansyah et al., 2021). Children who exhibit better self-regulation skills can elicit more positive interactions with teachers, which in turn increases their enjoyment of school and other learning-related activities, suggesting that the quality of the teacher-child relationship may serve as a mediator in associations. Self-regulation helps children to easily interact with the environment around them so that children feel accepted and comfortable in the environment where they are (Portilla et al., 2014).

Self-regulation is also interpreted as a process of exercising self-restraint, this is as conveyed by Aulia and Amra, (2021), Laela et al., (2023), Riley et al., (2008), and Sa'diah et al., (2022) state that Self-regulation is the process of controlling the actions to be taken, thought processes, and self-emotions. Self-regulation helps a child to know what he must do if he wants to adapt to his environment and what efforts are the best to make (Qistia et al., 2019). The ability of children's self-regulation when viewed from a psychological perspective is very closely related to emotional regulation. Self-regulation described by (Amalina et al., 2022; Eisenberg et al., 2001; Febriyani & Warmansyah, 2021) is something related to emotions which includes the process of initiating, maintaining, managing, or changing events, intensity, or the duration of the internal

feeling state. Self-regulation in children will help these children to regulate their emotions when they are at school or elsewhere, besides that good self-regulation will make it easier for children to adapt to activities. This will also have an impact on the child's academic results (Lau & Rahardjo, 2020).

Self-regulation has a major influence on children's emotional and social development, as stated by Charlesworth (2011), Elina (2021), and Laela et al., (2023) which states that self-regulation is the ability to control emotions, and interact with others positively, avoid negative actions, and be directed to become self-learners. Children who can control their behavior well will tend to have good social skills. Self-regulation helps children regulate behavior independently to demonstrate their ability to meet social expectations social (Manab, 2016). From a cognitive point of view, self-regulation also influences children's development to stay focused and involved in activities at school (Coelho et al., 2019) stated that self-regulation relates to self-regulation, self-regulation skills such as taking turns in conversation and playing, staying in activities, and remembering instructions to function in everyday contexts. Children with good self-regulation abilities have good life skills such as being willing to queue, wanting to be involved in activities at school, and also have a sense of responsibility toward themselves (Friskilia & Winata, 2018; Setiyawati, 2019)

3 METHOD

3.1 *Research Desain*

This study aims to determine the effect of the approach to learning mathematics and self-regulation on the ability to recognize the concept of numbers at an early age. The research method used is quantitative research with the ANOVA 2 x 2 experimental method approach. The ANOVA test is a special form of statistical analysis to test the hypothesis of a comparison of more than two groups. This study has three variables studied, namely the mathematics learning approach which acts as a treatment variable and is divided into two levels, namely Realistic Mathematics Education (RME) (A1) and Open Ended (A2). While the second independent variable is self-regulation which acts as a treatment variable divided into two levels, namely high self-regulation (B1) and low self-regulation (B2). The dependent variable is the ability to recognize the concept of numbers.

3.2 *Participants*

The target population in this study was group A PAUD/SPS students in the Tanah Datar district. As a comparison, the reachable population in this study were Group A PAUD/SPS students in Sungai Tarab and Lima Kaum Districts. Sampling with Simple Random Sampling technique. results and discussion. The research was conducted in two different places, Lenggogeni Kindergarten with a Realistic Mathematics Education approach and Pertiwi Kindergarten with an open-ended approach. The number of samples in the study can be seen in Table 1.

Table 1. Sample Distribution by Treatment

	A_1	A_2	Number
B_1	35	35	70
B_2	35	35	70
Total	70	70	140

3.3 *Data Collection*

Data collection in this study was carried out by observation by researchers using a checklist developed from aspects and indicators with a scale of 1-3 for the dependent variable, namely the ability to recognize the concept of numbers, and yes/no for attribute variables, namely self-regulation. The development of a test instrument for the ability to recognize the concept of numbers begins with the collection of a theoretical framework which is then synthesized and developed into aspects of the ability to recognize the concept of numbers and aspects of self-regulation. Furthermore, the preparation of indicators and broken down into statement items. Furthermore, the instrument is tested with expert judgment, namely the extent to which the instrument items measure aspects of the ability to recognize the concept of numbers and self-regulation. Once the instrument is approved, it is then tested on children as a trial sample. The instrument validation process is carried out by analyzing the results of the number recognition test as a data collection tool so that the validity and reliability are known in advance.

To determine the category of self-regulation which is divided into two groups, namely High Self-Regulation and Low Self-Regulation. This was done as follows: 32 students in each group measured the level of self-regulation using the instrument being tested. The values obtained are sorted from the highest to the lowest. From the results of these measurements, the High Self-Regulation and Low Self-Regulation groups were determined—the appropriate upper and lower groups from 25% to 33% (Cohen−Swerdlik, 2009).

3.4 *Data Analysis*

To analyze the data in this study, a two-way analysis of variance (ANOVA) was used with a design treatment level of 2 x 2. For hypothesis testing to be carried out, it is necessary to carry out analysis requirements tests, namely normality tests and homogeneity tests. Existing data is processed so that it has a meaning that is useful for answering problems in research and for testing hypotheses. Calculations are performed using statistical software, the program used is a program for processing statistical data, namely Statistical Package for Special Science (SPSS) 24.

4 RESULT AND DISCUSSION

4.1 *Result*

The results obtained in the treatment of the Ability to Recognize Number Concepts through an approach to learning mathematics and paying attention to children's self-

regulation obtained data on the Ability to Recognize Number Concepts. Hypothesis testing in this study was carried out using a two-way analysis of variance (ANOVA). Two-way ANOVA is used to test the main effect, interaction effect, and simple effect between the media and self-regulation in recognizing the concept of numbers. Furthermore, suppose that the results of calculations from the data indicate that there is an interaction between the media and self-regulation of the ability to recognize the concept of Numbers. In this case, the calculation is done using the Tuckey Test formula. The following table, results of the Two-Way ANOVA calculations can be seen in Table 3.

Table 3. Results of Analysis of Variance Using Two-Way ANOVA

Source of Variance	Db	JK	RJK	F_{hitung}		F_{table}	
						0.05	0.01
Between Columns	1	166.53	166.53	25.463	*	4.20	7.64
Between Lines	1	30.03	30.03	4.592	*	4.20	7.64
Interaction	1	850.78	850.78	130.085	**	4.20	7.64
in	28	183.13	6.54				
Total Reduced	31	1230.47					

Based on the table above, the average score of the ability to recognize the concept of numbers in each treatment through a mathematics learning approach with children's self-regulation intersects. Thus, there is a significant interaction between the two variables, namely the media with self-regulation of the ability to recognize the concept of numbers. The test criterion used is to reject H0 if F0 > F-table. There is an interaction and significance between media and self-regulation in the analysis of variance above. Then the test is continued with the Tuckey test between data pairs to find out which group's average is higher between the two paired data groups. The results of the Tuckey test calculations for the compared groups can be seen in Table 4.

Table 4. Tuckey Test Advanced Calculation Results

Group	N	Q-Count	Q table	Conclusion
			$\alpha = 0,05$	
A1 B1 – A2 B1	32	16,45	4,60	significant
A1 B2 – A2 B2	32	6,36	4,60	significant

4.2 *Discussion*

4.2.1 *Differences in the Ability to Recognize Number Concepts between children who were given the RME Approach and the Open-Ended Approach*

The results of the data analysis proved that there were significant differences in the ability to recognize the concept of the number of children in group A who were treated through the RME approach and children who were given treatment through the Open-Ended approach. This proves that treatment using the RME approach affects the ability to recognize the concept of numbers in group A children. The results obtained above can

be explained that learning the concept of numbers can be done using the RME approach. The findings in the field showed that there was a high level of interest in the children towards the RME approach, such as when the number-composing game was carried out using candy numbers, it seemed that the children were very enthusiastic about playing it. with everyday life (Hamidah et al., 2021). It is proven that when giving treatment using the RME approach, children are actively involved in the game of saying numbers, showing numbers, and sorting numbers. In a real and conceptual view interacting in an activity that gives children experience will encourage children to accept what they are learning (Dennick, 2016). Other theoretical support states that learning using the RME approach requires support from the teacher regarding the learning process that will be carried out. The use of the RME approach makes it easier for teachers to develop children's number concept abilities. When the learning activities took place at the time of the research, the RME approach was played repeatedly and involved the children directly in it. This activity was fun. This finding is in line with the findings explained by Chisara et al., (2018) that there is learning that involves children and stimulates literacy and learning starts with getting children to participate, think, find ideas, and gain experience. So, it can be concluded that learning using the RME approach will make it easier for children to improve their ability to recognize the concept of numbers.

Furthermore, the results of the study showed that there was an increase in children's ability to say numbers 1,2,3,4,5,6,7,8,910 sequentially, and children could also say numbers 1-10 randomly. This can be seen from the results of the post-test after learning to recognize the concept of numbers using the RME approach. The use of the RME approach is attractive to children because it has the characteristics of using real contexts, using models for progressive mathematization, interactivity, and engagement. The findings in the field stated that using the RME approach in the presence of a real context provides an attraction for children which can increase interest, and imagination, generate curiosity, and be fun. It is concluded that the use of the RME approach allows children to remember the material because the learning situation is in a pleasant state.

According to the results of the calculation of the data analysis, it was found that the score on the ability to recognize the concept of numbers in group A was higher in children who were given treatment through the RME approach. The findings in the field show that during play activities using the RME approach, children can say numbers after the numbers shown by researchers, for example, researchers show number 1, and after number one the child says number 2, then after number 2 the child says number 3, and so on until the number 10, with this activity the child is increasingly curious and wants to guess the numbers. In line with the characteristics of the RME approach stated by Fajriah & Asiskawati, (2015), namely the RME approach makes children interested in learning. This has an impact on children's involvement in learning activities, children become more interested and motivated. Another theoretical support is the results of research on the RME approach to the whole numbers (Adjie et al., 2019). So, it can be concluded from the results of the post-test that there is an influence from the RME approach by increasing the ability to recognize the concept of numbers in group A children.

Increased ability to recognize children's number concepts due to active involvement of children in games with the RME approach. The findings in the field show that there is a child's trust in the researcher after the game with the RME approach.

In the group of children who were given treatment through the Open-Ended approach, it was lower than that given by the RME approach. This is because the Open Ended (OE) approach is an approach that starts from a perspective with efforts that can be made in evaluating students' abilities objectively (Sutama et al., 2021). During the study, the children were not as enthusiastic as they were when using the RME approach. This affects the involvement of children in increasing the ability to recognize the concept of numbers such as children being asked to say numbers in the Open-Ended approach, when children cannot say, researchers and teachers repeat it many times. This finding, when examined, is in line with the concept which states that the Open-Ended approach only focuses on the information provided, such as mentioning numbers or words in learning activities (Weller et al., 2018). In addition, the Open Ended approach only focuses on children repeating material that has been presented and memorizing symbols related to the ability to recognize the concept of numbers (Rohmalina et al., 2020). The use of an open-ended approach to the learning process makes the teacher focus more on the learning outcomes that the child gets by remembering the learning content. This makes the open-ended approach less attractive because it only focuses on improving children's memory. This is because the provision of material using an open-ended approach takes place repeatedly without regard to the child's mental condition and readiness in participating in the learning process.

Based on this explanation and the results of statistical calculations, it can be concluded that the ability to recognize number concepts in group A children who were treated using the RME approach was higher than children who were treated using the OE approach.

4.2.2 *Interaction between Approaches to learning mathematics and Self-Regulation on the Ability to Recognize Number Concepts (INT A X B*

The results of the data analysis proved that there was an interaction effect between the treatments using the mathematics learning approach and self-regulation on the ability to recognize number concepts. So, it can be concluded that there is an interaction effect between the treatment using a mathematics learning approach and self-regulation on the ability to recognize the concept of numbers. Based on the findings in the field, it proves that when a child's self-regulation is high enough it will increase the child's concentration in learning activities, thus the child will be active in the learning process. If the child is active in learning, the child will be able to master the discussion given by the teacher, such as learning to recognize the concept of numbers. In addition, the research findings also prove that there is an influence of a play-based approach to learning mathematics on self-regulation and the ability to recognize children's number concepts. This can be seen when in learning activities to get to know the concept of numbers of children who are enthusiastic, actively involved, confident, and ask simple questions.

The results of the research conducted support the findings that in learning activities using a mathematics learning approach will make it easier for teachers to provide learning. Learning provided by the teacher will be more interesting and innovative. The mathematics learning approach can also motivate children to be more active and creative in learning activities while playing. It is understood that the approach to learning mathematics given by the teacher to children in an interesting way can focus the children's attention and make children enthusiastic in the learning process. Every learning carried out must fulfill several elements that need to be considered including the learning objectives, the materials needed, the media used and there is an evaluation of each lesson. The use of media in the learning process will make the learning atmosphere better. The mathematics learning approach used should provide media assistance in a concrete and fun way because then learning will be more easily directed, and more efficient in terms of time and energy.

The use of a mathematics learning approach to developing the ability to recognize the concept of children's numbers can be said to be appropriate. It can be seen from the research results that children can compare many and few objects, say numbers 1-10 in sequence, count numbers 1-10, and also show numbers 1-10. This is because the learning approach given contains elements of play. It was explained that using a game-based approach to learning mathematics makes learning activities more enjoyable Costa et al., 2019). Furthermore, in a research result, the use of a mathematics learning approach by playing makes children focus and creates the cohesiveness of a playing team (García-Sánchez et al., 2018). The development of the ability to recognize the concept of numbers is supported using the RME approach and the Open-Ended approach. A theory states that a learning approach that uses game techniques is useful for achieving learning goals, and can convey learning content, activities, and experiences (Rahmawati, 2013).

Furthermore, other studies state that activities with children through play strengthen various mental abilities such as logical reasoning, emotional understanding, emotional control, long-term attention, imagery, assessing others, and controlling behavior (Amalina, 2020). It can be understood that learning using a learning approach based on games has an impact on children's self-regulation. In addition to learning approaches to support self-regulation, children can also help children develop number concept abilities. At the time the research was taking place the use of the RME approach began with children being able to participate in play activities until they were finished. Not only are they able to survive, but the child follows the process in the game, such as comparing more numbers, also focusing on watching the game. Self-regulation can be understood as control within the child to focus on a particular activity. The results of a study state that children's self-regulation can develop good emotional skills, social skills, and cognitive skills (Friskilia & Winata, 2018). Several components of cognitive self-regulation that affect children's abilities are attention flexibility, working memory, and inhibition control (Becker et al., 2014).

Providing treatment through the RME approach and the Open-Ended approach can be a tool in facilitating the delivery of material in recognizing the concept of numbers to children. Likewise, the support of self-regulation helps children to be able to be involved in learning activities to recognize the concept of children's numbers. This is reinforced by research results that children's self-regulation supports the ability to interact with the surrounding environment such as with teachers, and peers, and is active in activities in preschool classrooms (Bohlmann & Downer, 2016; Eisenberg et al., 2010). Based on this explanation and the results of statistical calculations, it can be concluded that there is an interaction between the media and self-regulation on the ability to recognize the concept of numbers in group A children.

4.2.3 *Differences in the ability to recognize the concept of numbers between children who have high self-regulation given the RME approach and the open-ended approach.*

The results of the third hypothesis test rejected the null hypothesis which stated that the group of children in group A who had high self-regulation who were treated through the RME approach was higher than the group of children in group A who were given treatment through the Open-ended approach. The use of the RME approach strongly supports children who have high self-regulation. High self-regulation in children supports children's development in terms of controlling behavior such as emotions, focusing attention, and controlling actions so that children can be actively involved in learning activities (Hurtado, 2017). Self-regulation helps children to engage in RME approach activities. This is supported by the theory that self-regulation helps children understand themselves and engage in interactions with the surrounding environment. This occurs due to adaptive control of cognitive, emotional, and behavioral processes (Nisva & Okfrima, 2019). Another support is research conducted by Zhou, et.al that self-regulation helps children to have freedom of attention, working memory, and related behavioral inhibition control (Salminen et al., 2021).

The concept of the RME approach as explained by Handayani & Irawan (2020) is an approach that uses the reality and experiences of children as the beginning of knowledge of mathematics through the problems around it. Another opinion states that the RME approach is an approach that relates to the reality and daily life of children (Chisara et al., 2018). In learning activities to introduce the concept of numbers, researchers involve children by asking children to sequence numbers, mention the order of numbers, and show numbers. The findings in the field show that there is high involvement in children who have high self-regulation, children also understand the material given to children more easily because children's emotional control is high such as being involved in activities and controlling children's behavior such as concentrating in learning activities using the RME approach compared to the RME approach. Open Ended. This is analyzed by playing the RME approach with various and modified learning techniques used which also contribute to the involvement and acceptance of material by children. The RME approach provides fun and creative activities that free the mind without the constraints of pre-existing ideas or experiences. In different situations, a research result states that learning about the RME approach lasts longer for children and makes children happy in the

learning (Ningsih, 2014). In addition, the use of the Open-Ended approach also only focuses on children getting to know and remember. This is because the use of the Open-Ended approach is carried out repeatedly until the child memorizes the material being taught (Egbert et al., 2015). High self-regulation is more suitable given the RME approach than the Open-Ended approach. This is in line with the results of research where the RME approach encourages children to be actively involved and have a high curiosity in learning activities to recognize the concept of numbers. The results of this study are in line with the concept that self-regulation helps children to understand themselves, understand situations, and how to interact with situations that occur as children's goals (Anselmus & Parikaes, 2018; Jaramillo et al., 2017)

Many studies support the concept of using the RME approach, namely learning can be used as a goal to master something (Rahmawati, 2013). In addition, the form of the child-centered RME approach is stated to contribute to providing emotional and physical experiences, the child's involvement in the RME approach can reflect the child's emotions and thoughts (Rismaratri & Nuryadi, 2017). Furthermore, in learning situations using the RME approach, children feel emotionally and cognitively involved with learning, and children will act in learning to achieve their goals (Prasetya et al., 2019). In supporting children to develop the ability to recognize the concept of numbers. The use of the RME approach with direct learning techniques with children as the main role in the learning process. The RME approach can be said to provide a memorable experience for children. It is explained that the involvement of children in the approach does not provide limitations for children in learning and can help children's comprehension and can increase their mental strength. Furthermore, the use of the RME approach is the result of innovation that emphasizes personal experience in learning. As is the case with research on the effect of the realistic mathematics reduction (RME) approach on problem-solving abilities, namely encouraging children to be able to imagine and innovate in solving problems in learning and to be able to get their pleasure and satisfaction in children (Apriani & Maryam, 2020).

The research findings regarding learning to recognize the concept of numbers using the RME approach involve the interaction of both children with children and children with the teacher and freely expressing their imagination, this can be seen when children solve simple problems by involving the RME approach in learning. This is in line with research conducted by Supriaji and Soliyah, (2021) regarding the RME approach with activities to sequence numbers, arrange numbers and imitate numbers in learning. Furthermore, it can be explained that the RME approach has several advantages, namely a) in playing the RME approach can involve children actively, and children are given the freedom to explore, b) Techniques by presenting real objects that are closely related to everyday life will create curiosity high knowledge in children c) teachers can modify learning in such a way that children are interested in learning it and design it according to the content and learning needs of children so that its use becomes flexible, d) teachers and children can jointly solve problems in playing the RME approach (Ardiniawan et al., 2022). Therefore, it can be concluded that children who have high self-regulation who are treated through

the RME approach have a significantly higher ability to recognize number concepts compared to children who have high self-regulation who are treated using the Open-Ended approach.

4.2.4 *Differences in Ability to Recognize Number Concepts between children who have low self-regulation who are given the RME Approach and the Open-Ended Approach*

By paying attention to the conclusions above which are different from the previous hypothesis analysis, it can be said that children with a low level of self-regulation, the ability to recognize the concept of numbers in group A children who were treated through the RME approach were lower than children who were given the Open-Ended approach.

Low self-regulation can make it difficult for children to survive situations in the classroom environment. Seeing from the results of the study that for children who have low concentration when given material to recognize the concept of numbers using the Open-Ended approach, it is easier for children to recognize numbers, but when children have difficulty ordering numbers 1-10, teachers and researchers repeatedly use the Open approach. Ended until the child can remember the numbers. These findings are supported by Rudyanto (2016), who stated that children with low self-regulation tend not to participate in learning activities, children cannot survive for a while in class, which causes harm to children in the future the condition of children who have low self-regulation, implementation of the ability to recognize the concept of numbers is also low. This is in line with the results of research by Faridah and Aeni (2016) that low self-regulation has an impact on weak behavior control such as a child's weak ability to see opportunities and available resources in the environment around the child. It can be said that children with a low level of self-regulation, and the ability to recognize the concept of numbers in group A children who were treated through the RME approach were lower than children who were given the Open-Ended approach.

The development of the ability to recognize the concept of numbers in Group A children with low self-regulation can be done using an open-ended approach. The researcher gave treatment by showing numbers repeatedly, after which the children were asked to name the numbers. However, children who have low concentration and do not want to participate in learning activities are given the treatment repeatedly so that the child knows the numbers and shows the numbers requested by the teacher. It was explained that the Open-Ended approach helps children to recognize and remember the concept of the numbers given (Rudyanto, 2016). Furthermore, the Open Ended approach can be used by repetition as a learning exercise to help children memorize numbers or symbols (Taman et al., 2020). The findings of the study also saw an increase in the ability to recognize number concepts in children with low self-regulation using the Open-Ended approach, such as children being able to sort the numbers 1-5 after being given treatment with the Open-Ended approach repeatedly. Children are also invited to count the number of objects repeatedly until the child focuses on the object to be shown. This finding is supported by research results which state that the Open-Ended approach is widely used by teachers to improve children's ability to recognize the concept of the number they want

to achieve. but this usually only helps to get to know (know numbers, know colors, and so on). For higher memorization, the teacher needs to do repeated exercises with the child (Hayati & Fitri, 2016).

The open-ended approach is a learning process that provides problems with mathematical concepts that will be discussed by educators with students with an open nature with the intention of educators providing challenges to students in answering these challenges with various solutions for solving them (Faridah et al., 2016). Not only providing various kinds of solutions to solving problems, the meaning of being open is to provide opportunities for students to solve problems in their way but still correct (Rohmalina et al., 2020). In line with research conducted by Eka (2016), stated that the ability to recognize the concept of numbers in children through an open end learning approach will provide opportunities for children to investigate existing problems in depth so that with this, children can solve them. existing problems critically and creatively. Because an open learning approach can improve children's ability to think creatively and critically (Rudyanto, 2016). In line with the statement that open-ended approaches used at low concentration levels have an impact on improving preschool performance in early math skills, but this growth varies based on the child's level of understanding (Kurnia, 2015). In addition, the Open Ended Approach can be designed with low cost and easy procedures that support teachers to make learning tools (Mulyana et al., 2022).

The open-ended approach can also help children improve their English language skills, namely knowing words and making it easier to read sentences. It can be understood that the open-ended approach emphasizes the activities of reading pictures, writing, and briefly recognizing symbols because the system using the open-ended approach is carried out by repetition (Delyana, 2015). So, children with low self-regulation such as difficulty concentrating can accept learning activities with the Open-Ended approach which is carried out repeatedly. An open-ended approach is used by holding the card up and showing the child, then showing the card containing learning material, asking the child to observe the contents of the card, and repeating the activity until the child remembers the material to be taught (Sumardi et al., 2017).

This shows that the open-ended approach can be used for children who have low levels of concentration. Because the teacher can repeatedly show the open-ended approach until the child remembers the learning material. Developing the ability to recognize the concept of numbers in children with low self-regulation will be easier by using an open-ended approach. This is supported by research results that the Open-Ended approach requires more understanding when playing it, does not require prior knowledge or experience about the substance, and can also help children recognize material that is difficult to teach (Hayati & Fitri, 2016). Apart from that, the use of an open-ended approach can also be learned to set according to the goals to be achieved for each child (Asri Devi, 2020). Based on this suitability, children who have a low level of self-regulation, and a low ability to recognize the concept of numbers, will be better off if they are given treatment using the Open-Ended approach.

5 CONCLUSION

The approach to learning mathematics affects the ability to recognize the concept of numbers of group A children in kindergarten. The Realist-tic Mathematics Education (RME) approach is more suitable for the introduction of number concepts in preschoolers with high self-regulation compared to using the Open-Ended approach. It is proven that children with high self-regulation are better able to engage, concentrate, and be active in learning activities to recognize the concept of numbers using a realistic mathematics education approach. While the open-ended approach is more suitable for preschool-age children who have low self-regulation and concentration and have difficulty controlling themselves in class. This is supported by an open-ended approach providing a great opportunity for children to build a comprehensive construction of mathematical knowledge. Teachers can provide learning to recognize the concept of numbers by focusing on one child only. However, this study still needs comprehensive research. This study only examined children in group A with an age range of 4-5 years. Factors influencing the introduction of the concept of numbers in children are not only approached to learning mathematics and self-relation. Many other factors play a role, such as nutritional status, school stratification, and parenting.

6 REFERENCES

Adjie, N., Putri, S. U., & Dewi, F. (2019). Penerapan Pendidikan Matematika Realistik (PMR) dalam Meningkatkan Pemahaman Konsep Bilangan Cacah pada Anak Usia Dini. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *4*(1), 336. https://doi.org/10.31004/obsesi.v4i1.338

Adjie, N., Putri, S. U., & Dewi, F. (2020). Peningkatan Kemampuan Koneksi Matematika melalui Pendidikan Matematika Realistik (PMR) pada Anak Usia Dini. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *5*(2), 1325–1338. https://doi.org/10.31004/obsesi.v5i2.846

Adjie, N., Putri, S. U., & Dewi, F. (2021). Improvement of Basic Math Skills Through Realistic Mathematics Education (RME) in Early Childhood. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *6*(3), 1647–1657. https://doi.org/10.31004/obsesi.v6i3.1832

Amalina, A. (2020). Pembelajaran Matematika Anak Usia Dini di Masa Pandemi COVID-19 Tahun 2020. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *5*(1), 538. https://doi.org/10.31004/obsesi.v5i1.592

Amalina, A., Yanti, F., & Warmansyah, J. (2022). Penerapan Pendekatan Matematika Realistik terhadap Kemampuan Pemahaman Konsep Pengukuran pada Anak Usia 5-6 Tahun. *Aulad: Journal on Early Childhood*, *5*(2), 306–312. https://doi.org/10.31004/aulad.v5i2.378

Amini, F., Munir, S., & Lasari, Y. L. (2022). Student Mathematical Problem Solving Ability in Elementary School: The Effect of Guided Discovery Learning. *Journal of Islamic Education Students (JIES)*, *2*(2), 49. https://doi.org/10.31958/jies.v2i2.5592

Anselmus, Z., & Parikaes, P. (2018). Regulasi Diri Dalam Belajar Sebagai Konsekuen. *Jurnal Penelitain Dan Pengembangan Pendidikan*, *1*(1), 82–95.

Apriani, N., & Maryam, K. (2020). *Pengaruh Pendekatan Realistic Matematick Edukation (RME) Terhadap Kemampuan Pemecahan Masalah*. *3*(1), 12–19.

Ardiniawan, D. Y., Subiyantoro, S., & Kurniawan, S. B. (2022). *Peningkatan Kemampuan*

Penalaran Matematis Siswa Sekolah Dasar Melalui Pendekatan Realistic Mathematics Education (RME) Siswa SD Se-Kecamatan Pacitan. *April*, 607–613.

Asri Devi, N. M. I. (2020). Pengembangan Media Pembelajaran Puzzle Angka untuk Meningkatkan Kemampuan Mengenal Lambang Bilangan. *Jurnal Ilmiah Pendidikan Profesi Guru*, *3*(3), 416. https://doi.org/10.23887/jippg.v3i3.28331

Aulia, M., & Amra, A. (2021). Parent's Participation in Improving the Quality of Education in Elementary Schools. *Journal of Islamic Education Students (JIES)*, *1*(2), 58. https://doi.org/10.31958/jies.v1i2.3004

Aziza, A., Pratiwi, H., & Ageng Pramesty Koernarso, D. (2020). Pengaruh Metode Montessori dalam Meningkatkan Pemahaman Konsep Matematika Anak Usia Dini di Banjarmasin. *AL-ATHFAL : JURNAL PENDIDIKAN ANAK*, *6*(1), 15–26. https://doi.org/10.14421/al-athfal.2020.61-02

Becker, D. R., Miao, A., Duncan, R., & Mcclelland, M. (2014). Behavioral self-regulation and executive function both predict visuomotor skills and early academic achievement. *Early Childhood Research Quarterly*, 1–14. https://doi.org/10.1016/j.ecresq.2014.04.014

Bohlmann, N. L., & Downer, J. T. (2016). Self-Regulation and Task Engagement as Predictors of Emergent Language and Literacy Skills. *Early Education and Development*, *27*(1), 18–37. https://doi.org/10.1080/10409289.2015.1046784

Brandes-Aitken, A., Braren, S., Swingler, M., Voegtline, K., & Blair, C. (2019). Sustained attention in infancy: A foundation for the development of multiple aspects of self-regulation for children in poverty. *Journal of Experimental Child Psychology*, *184*, 192–209. https://doi.org/10.1016/j.jecp.2019.04.006

Charlesworth, R. (2005). *Experiences in Math for Young Children Fifth Edition* (3rd edition). Delmar Cengage Learning.

Charlesworth, R. (2011). Understanding *child development*. Wadsworth Publishing.

Chisara, C., Hakim, D. L., & Kartika, H. (2018). Implementasi Pendekatan Realistic Mathematics Education (RME) Dalam Pembelajaran Matematika. *Prosiding Sesiomadika*, 65–72.

Cobb, P., Zhao, Q., & Visnovska, J. (2008). Learning from and adapting the theory of realistic mathematics education. *Éducation et Didactique*, *2*(1), 105–124.

Coelho, V., Cadima, J., Pinto, A. I., & Guimarães, C. (2019). Self-Regulation, Engagement, and Developmental Functioning in Preschool-Aged Children. *Journal of Early Intervention*, *41*(2), 105–124. https://doi.org/10.1177/1053815118810238

Cohen−Swerdlik. (2009). Psychology: Psychological Testing and Assessment An Introduction to Test and Measurement 7th Edition. In McGraw-Hill (7th ed.). McGraw-Hill. https://doi.org/13: 9780767421577

Costa, P., Ermini, T., & Sigaud, C. H. de S. (2019). Effects of an educational playful intervention on nasal hygiene behaviors of preschoolers: a quasi-experimental study. *Health Promotion Perspectives*, *9*(1), 50–54. https://doi.org/10.15171/hpp.2019.06

Deflorio, L., Klein, A., Starkey, P., Swank, P. R., Taylor, H. B., Halliday, S. E., Beliakoff, A., & Mulcahy, C. (2018). A study of the developing relations between self-regulation and mathematical knowledge in the context of early math intervention. *Early Childhood Research Quarterly*. https://doi.org/10.1016/j.ecresq.2018.06.008

Delyana, H. (2015). Peningkatan Kemampuan Pemecahan Masalah Matematika Siswa Kelas VII Melalui Penerapan Pendekatan Open Ended. *Lemma*, *2*(1), 26–34.

Dennick, R. (2016). Constructivism: reflections on twenty-five years teaching the constructivist approach in medical education. *International Journal of Medical Education*, *7*(July),

200–205. https://doi.org/10.5116/ijme.5763.de11

Deny, S. (2019). Survei PISA 2018: Skor Pendidikan Indonesia Masih di Bawah Rata-Rata. *04 Desember*.

Dwipayana, I. K. A. A., & Diputra, K. S. (2019). Pengaruh Pendekatan Pendidikan Matematika Realistik Berbasis Open Ended Terhadap Kemampuan Berpikir Kreatif Siswa. *Journal of Education Technology*, *2*(3), 87. https://doi.org/10.23887/jet.v2i3.16380

Egbert, J., Herman, D., & Lee, H. (2015). *Flipped Instruction in English Language Teacher Education : A Design- - - based Study in a Complex, Open- - - ended Learning Environment*. *19*(2), 1–23.

Eisenberg, N., Pidada, S., & Liew, J. (2001). The Relations of Regulation and negative emotionality to Indonesian Children's social functioning. *Child Development*, *72*(6), 1747–1763. https://doi.org/10.1111/1467-8624.00376

Eisenberg, N., Valiente, C., & Eggum, N. D. (2010). Self-Regulation and School Readiness. *Early Education & Development*, *21*(5), 681–698. https://doi.org/10.1080/10409289.2010.497451

Eka, F. (2016). Penerapan Model Pembelajaran Open Ended Pada Pembelajaran Matematika Kelas V Untuk Meningkatkan Keterampilan Berpikir Kritis Siswa di Madrasah Ibtidaiyah Al-Munawwarah Kota Jambi. *Skripsi*, *4*(1), 1–23.

Elina, R. (2021). Journal of Islamic Education Students The Effect of Administrative Services on Students' Satisfaction. *JIES: Journal of Islamic Education Students*, *1*(1), 39–47.

Elliott, W., Jung, H., & Friedline, T. (2016). Math Achievement and Children's Savings: Implications for Child Development Accounts. *Journal of Family and Economic Issues*, *31*(2), 171–184. https://doi.org/10.1007/s10834-010-9185-4

Evi, S. (2011). Pendekatan Matematika Realistik (PMR) untuk Meningkatkan Kemampuan Berfikir Siswa di Tingkat Sekolah Dasar. *Jurnal Penelitian Pendidikan*, *Edisi Khus*(2), 154–163.

Fajriah, N., & Asiskawati, E. (2015). Kemampuan Berfikir Kreatif Siswa dalam Pembelajaran Matematika Menggunakan Pendidikan Matematika Realistik di SMP. *Pendidikan Matematika*, *3*(2), 157–165.

Faridah, N., Isrok'atun, I., & Aeni, A. N. (2016). Pendekatan Open-Ended Untuk Meningkatkan Kemampuan Berpikir Kreatif Matematis Dan Kepercayaan Diri Siswa. *Jurnal Pena Ilmiah*, *1*(1).

Fathonah, R. N. (2021). *Video Kegiatan Rote Counting dan Rational Counting untuk Menstimulasi Berhitung Permulaan pada Anak Usia (4-5) Tahun*. https://doi.org/10.36706/jtk.v8i2.14630

Febriyani, E., & Warmansyah, J. (2021). Akreditasi Satuan PAUD Berbasis Sistem Penilaian Akreditasi (SISPENA). *Journal of Science and Technology*, *1*(2), 3.

Friskilia, O., & Winata, H. (2018). Regulasi Diri (Pengaturan Diri) Sebagai Determinan Hasil Belajar Siswa Sekolah Menengah Kejuruan. *Jurnal Pendidikan Manajemen Perkantoran*, *3*(1), 184. https://doi.org/10.17509/jpm.v3i1.9454

Frye, D., Baroody, A. J., Burchinal, M., Carver, S. M., Jordan, N. C., & McDowell, J. (2014). *Teaching math to young children: A practice guide (NCEE 2014-4005)*. Department of Education.

García-Sánchez, P., Tonda, A., Mora, A. M., Squillero, G., & Merelo, J. J. (2018). Automated playtesting in collectible card games using evolutionary algorithms: A case study in Hearthstone. *Knowledge-Based Systems*, *153*, 133–146.

https://doi.org/10.1016/j.knosys.2018.04.030

Greenberg, J. (2012). *M ore, A ll G one , E mpty , Every Day in Every Way Coming soon ! May*, 62–64.

Hamidah, N. H., Lidinillah, D. A. M., & Muslihin, H. Y. (2021). *Desain Lembar Kerja Anak Berbasis Realistic Mathematika Education (RME) untuk Mengenalkan Konsep Bilangan Anak Usia Sciencs Study) siswa Negara Indonesia*. *5*(1), 1–9.

Handayani, S. D., & Irawan, A. (2020). Pembelajaran matematika di masa pandemic covid-19 berdasarkan pendekatan matematika realistik. *Jurnal Math Educator Nusantara: Wahana Publikasi Karya Tulis Ilmiah Di Bidang Pendidikan Matematika*, *6*(2), 179–189. https://doi.org/10.29407/jmen.v6i2.14813

Haryuni, S. (2013). Peningkatan Kemampuan Mengenal Bilangan Melalui Media Domino Segitiga di PAUD Kenanga I Kabupaten Pesisir Selatan. *Spektrum PLS*, *1*(1), 103–118.

Hayati, N., & Fitri, R. (2016). Bombik Modifikasi Pada Anak Kelompok Bermain. *Jurnal Paud Teratai*, *5*(3), 1–5.

Hendrik, J., & Susanti. (2019). Perancangan Aplikasi Tes Psikologi Kecerdasan Majemuk Menggunakan Howard Gardner ' S Theory of Multiple Intelligences Dengan Microsoft Visual Basic . Net. *Jurnal TIMES*, *VIII*(1), 54–62.

Hidayat, E. I. F., Vivi Yandhari, I. A., & Alamsyah, T. P. (2020). Efektivitas Pendekatan Realistic Mathematics Education (RME) Untuk Meningkatkan Kemampuan Pemahaman Konsep Matematika Siswa Kelas V. *Jurnal Ilmiah Sekolah Dasar*, *4*(1), 106. https://doi.org/10.23887/jisd.v4i1.21103

Hurtado, C. M. (2017). *The Role Of And Quality Of Head Start Experiences In the Development Of Self-Regulatation*.

Ivrendi, A. (2011). Influence of Self-Regulation on the Development of Children's Number Sense. *Early Childhood Education Journal*. https://doi.org/10.1007/s10643-011-0462-0

Jampel, I. N., & Puspita, K. R. (2017). Peningkatan Hasil Belajar Siswa Sekolah Dasar Melalui Aktivitas Pembelajaran Mengamati Berbantuan Audiovisual. *International Journal of Elementary Education*, *1*(3), 197. https://doi.org/10.23887/ijee.v1i3.10156

Jaramillo, J. M., Rendón, M. I., Muñoz, L., Weis, M., Trommsdorff, G., & Medina, A. M. (2017). Children *s Self-Regulation in Cultural Contexts : The Role of Parental Socialization Theories, Goals, and Practices*. *8*(June), 1–9. https://doi.org/10.3389/fpsyg.2017.00923

Jennifer, J. C., Margaret, M., & Leow, C. (2014). *A Survey Study of Early Childhood Teachers ' Beliefs and Confidence about Teaching Early Math*. 367–377. https://doi.org/10.1007/s10643-013-0619-0

Kurnia. (2015). Penerapan Model Problem Based Learning Untuk Meningkatkan Kemampuan Menulis Teks Eksposisi Pada Siswa Kelas X II-4 SMA Negeri 8 Makassar. *Jurnal Pepatudzu*, *9*(1), 72–84.

Laela, M. N., Ashari, F. A., & Nurcahyani, L. D. (2023). Development of APE Jemari Keahlian to Develop Cognitive Abilities in Children 4-5 Years Old. *Indonesian Journal of Early Childhood Educational Research*, *1*(2), 97–106. https://doi.org/10.31958/ijecer.v1i2.8158

Lau, Y. S., & Rahardjo, M. M. (2020). Meningkatkan Budaya Antri Anak Usia 4-5 Tahun melalui Metode Berbaris Sesuai Warna. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *5*(1), 755. https://doi.org/10.31004/obsesi.v5i1.624

Liwis, N. W. N., & Antara, P. A. (2017). Pengaruh Model Pembelajaran Matematika Realistik Terhadap Kemampuan Mengenal Konsep Bilangan Pada Anak Kelompok A Taman

Kanak-Kanak Gugus V Kecamatan Buleleng Gugus V Kecamatan Buleleng Tahun Ajaran 2016/2017. *Jurnal Pendidikan Anak Usia Dini Undiksha*, *5*(1). https://doi.org/http://dx.doi.org/10.23887/paud.v5i1.11403

Manab, A. (2016). Memahami regulasi diri: Sebuah tinjauan konseptual. *Psychology & Humanity*, 7–11.

McGuire, P., Kinzie, M. B., & Berch, D. B. (2012). Developing Number Sense in Pre-K with Five-Frames. *Early Childhood Education Journal*. https://doi.org/10.1007/s10643-011-0479-4

Mclaughlin, T., Gordon, C., & Ayivor, J. (2013). An Evaluation of the Direct Instruction Model-Lead-Test Procedure and Rewards on Rote Counting, Number Recognition... *Indonesian Journal of Basic and Applied Science*, *2*(1), 98–109.

Mullis, I. V. S., Martin, M. O., Foy, P., & Hooper, M. (2015). *TIMSS 2015 International Results in Mathematics*.

Mulyana, F. A. P., Nandiyanto, A. B. D., & Kurniawan, T. (2022). E-learning Media for the Ability to Recognize and Count Numbers in Kindergarten Students. *International Journal of Research and Applied Technology*, *2*(1), 151–157. https://doi.org/10.34010/injuratech.v2i1.6784

Mulyati, C., Muiz, D. A., & Rahman, T. (2019). Pengembangan Media Papan Flanel Untuk Memfasilitasi Kemampuan Konsep Bilangan Anak Pada Kelompok B. *Jurnal Pendidikan Dan Konseling (JPDK)*, *1*(1), 59–68. https://doi.org/10.31004/jpdk.v1i1.362

Mulyati, S., & Sisrazeni, S. (2022). The Relationship Between Stressful Study And Students' Sleep Pattern During Covid-19 Pandemic. *Journal of Islamic Education Students (JIES)*, *2*(1), 21. https://doi.org/10.31958/jies.v2i1.4384

Mustikasari, M., Zulkardi, Z., & Aisyah, N. (2013). Pengembangan Soal-Soal Open-Ended Pokok Bahasan Bilangan Pecahan Di Sekolah Menengah Pertama. *Jurnal Pendidikan Matematika*, *4*(2). https://doi.org/10.22342/jpm.4.2.820 .

Muzakki, M., & Fauziah, P. Y. (2015). Implementasi pembelajaran anak usia dini berbasis budaya lokal di PAUD full day school. *Jurnal Pendidikan Dan Pemberdayaan Masyarakat*, *2*(1), 39. https://doi.org/10.21831/jppm.v2i1.4842

Nabighoh, W. N., Mustaji, M., & Hendratno, H. (2022). Meningkatkan Kecerdasan Logika Matematika Anak Usia Dini melalui Media Interaktif Puzzle Angka. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *6*(4), 3410–3417. https://doi.org/10.31004/obsesi.v6i4.2410

Narayani, N. P. U. D. (2019). Pengaruh Pendekatan Matematika Realistik Berbasis Pemecahan Masalah Berbantuan Media Konkret Terhadap Hasil Belajar Matematika. *Jurnal Ilmiah Sekolah Dasar*, *3*(2), 220. https://doi.org/10.23887/jisd.v3i2.17775

Ningsih, S. (2014). Realistic Mathematics Education: Model Alternatif Pembelajaran Matematika Sekolah. *Jurnal Pendidikan Matematika*, *1*(2), 73. https://doi.org/10.18592/jpm.v1i2.97

Nisva, L., & Okfrima, R. (2019). Hubungan Antara Regulasi Diri Dengan Palang Merah Indonesia. *Jurnal PSYCHE*, *12*(2), 155–164.

Nurina, D. L., & Retnawati, H. (2015). Keefektifan Pembelajaran Menggunakan Pendekatan Problem Posing dan Pendekatan Open-Ended Ditinjau Dari HOTS. *PYTHAGORAS: Jurnal Pendidikan Matematika*, *10*(2), 129. https://doi.org/10.21831/pg.v10i2.9128

Nurlatifah, D., Sudin, A., Maulana, M., & Kontekstual, P. (2017). Perbedaan Pengaruh Antara Pendekatan Realistik Dan Pendekatan Kontekstual Terhadap Pemahaman Matematis Siswa Pada Materi Kesebangunan. *Jurnal Pena Ilmiah*, *2*(1), 961–970.

Nurlita, M. (2015). Pengembangan Soal Terbuka (Open-Ended Problem) pada Mata Pelajaran Matematika SMP Kelas VIII. *Pythagoras: Jurnal Pendidikan Matematika*, *10*(1), 38–49.

O'Connor, P. A., Morsanyi, K., & McCormack, T. (2018). Young children's non-numerical ordering ability at the start of formal education longitudinally predicts their symbolic number skills and academic achievement in maths. *Developmental Science*, *21*(5), e12645. https://doi.org/10.1111/desc.12645

Oktaviana, W., Warmansyah, J., & Trimelia Utami, W. (2021). The Effectiveness of Using Big Book Media on Early Reading Skills in 5-6 Years Old. *Al-Athfal: Jurnal Pendidikan Anak*, *7*(2), 157–166. https://doi.org/10.14421/al-athfal.2021.72-06

Östergren, R., & Träff, U. (2013). Early number knowledge and cognitive ability affect early arithmetic ability. *Journal of Experimental Child Psychology*, *115*(3), 405–421. https://doi.org/10.1016/j.jecp.2013.03.007

Pendidikan, M., Kebudayaan, D. A. N., & Indonesia, R. (2014). *No Title*.

Ponitz, C. C., McClelland, M. M., Matthews, J. S., & Morrison, F. J. (2009). A Structured Observation of Behavioral Self-Regulation and Its Contribution to Kindergarten Outcomes. *Developmental Psychology*, *45*(3), 605–619. https://doi.org/10.1037/a0015365

Portilla, X. A., Ballard, P. J., Adler, N. E., Boyce, W. T., & Obradović, J. (2014). An integrative view of school functioning: Transactions between self-regulation, school engagement, and teacher-child relationship quality. *Child Development*, *85*(5), 1915–1931. https://doi.org/10.1111/cdev.12259

Prasetya, I., Ulima, E. T., Jayanti, I. D., Pangestu, S. G., Anggraeni, R., & Arfiah, S. (2019). Kegiatan Bimbingan Belajar dalam Meningkatkan Minat Belajar Siswa di Kelurahan Bolong Karanganyar. *Buletin KKN Pendidikan*, *1*(1). https://doi.org/10.23917/bkkndik.v1i1.9286

Purnomo, Y. W., Kowiyah, K., Alyani, F., & Assiti, S. S. (2014). Assessing Number Sense Performance of Indonesian Elementary School Students. *International Education Studies*, *7*(8). https://doi.org/10.5539/ies.v7n8p74

Putra, A. P. (2014). *Aji Permana Putra, Eksperimen Pendekatan Pembelajaran... I*, 1–10.

Qistia, N., Kurnia, R., & Novianti, R. (2019). Hubungan Regulasi Diri dengan Kemandirian Anak Usia Dini. *Aulad : Journal on Early Childhood*, *2*(3), 61–72. https://doi.org/10.31004/aulad.v2i3.35

Rahma, A., & Haviz, M. (2022). Implementation of Cooperative Learning Model with Make A Match Type on Students Learning Outcomes in Elementary School. *Journal of Islamic Education Students (JIES)*, *2*(2), 58. https://doi.org/10.31958/jies.v2i2.5593

Rahmawati, F. (2013). Pengaruh Pendekatan Pendidikan Realistik Matematika dalam Meningkatkan Kemampuan Komunikasi Matematis Siswa Sekolah Dasar. *Prosiding SEMIRATA 2013*, *1*(1), 225–238.

Rakhman, A., & Alam, S. K. (2022). Metode Bermain Kooperatif Dalam Meningkatkan Antusias Belajar Anak Usia Dini Pada Masa Covid-19. *Abdimas Siliwangi*, *5*(1). https://doi.org/http://dx.doi.org/10.22460/as.v5i1.6880

Riley, D., Juan, robert R. S., Klinkner, J., & Ramminger, A. (2008). *Social and Emotional Development*. redleaf press.

Rismaratri, D., & Nuryadi. (2017). Pengaruh Model Pembelajaran Quantum Dengan Pendekatan Realistic Mathematic Education (RME) Terhadap Kemampuan Berfikir Kreatif Dan Motivasi Belajar Matematika. *Jurnal Edukasi Matematika Dan Sains*, *5*(2).

Rohmalina, R., Aprianti, E., & Lestari, R. H. (2020). Pendekatan Open-Ended dalam Mempengaruhi Kemampuan Mengenal Konsep Bilangan Anak Usia Dini. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *5*(2), 1409–1418. https://doi.org/10.31004/obsesi.v5i2.805

Roliana, E. (2018). Urgensi Pengenalan Konsep Bilangan Pada Anak Usia Dini. *Nasional Pendidikan Dasar*, 417–420.

Rosdiani, A., & Warmansyah, J. (2021). Perancangan Game Edukasi Berhitung Berbasis Mobile Aplikasi Inventor. *Journal of Science and Technology*, *1*(2), 198–206.

Rudyanto, H. E. (2016). Pengembangan Kreativitas Siswa Sekolah Dasar Melalui Pembelajaran Matematika Open-Ended. *Premiere Educandum : Jurnal Pendidikan Dasar Dan Pembelajaran*, *3*(02), 184–192. https://doi.org/10.25273/pe.v3i02.275

Sa'diah, H., Zulhendri, Z., & Fadriati, F. (2022). Development of Learning Videos with Kinemaster-Based Stop Motion Animations on Thematic Learning in Elementary Schools. *Journal of Islamic Educational Students (JIES)*, *2*(2), 91. https://doi.org/10.31958/jies.v2i2.5615

Safitri, N. D., Hasanah, U., & Masruroh, F. (2023). The Development of Thematic Board Educational Game Tools to Train The Literacy Skills of Children 5-6 Years Old. *Indonesian Journal of Early Childhood Educational Research*, *1*(2), 75–86. https://doi.org/10.31958/ijecer.v1i2.8156

Salminen, J., Guedes, C., Lerkksnen, M. K., Pakarinen, E., & Cadima. (2021). *Teacher – child interaction quality and children s self-regulation in toddler classrooms in Finland and Portugal*. *December 2020*, 1–23. https://doi.org/10.1002/icd.2222

Sarnecka, B. W., & Lee, M. D. (2019). Levels of number knowledge during early childhood. *Journal of Experimental Child Psychology*, *103*(3), 325–337. https://doi.org/10.1016/j.jecp.2009.02.007

Sawyer, A. C. P., Chittleborough, C. R., Mittinty, M. N., Miller-Lewis, L. R., Sawyer, M. G., Sullivan, T., & Lynch, J. W. (2015). Are trajectories of self-regulation abilities from ages 2-3 to 6-7 associated with academic achievement in the early school years? *Child: Care, Health and Development*, *41*(5), 744–754. https://doi.org/10.1111/cch.12208

Setiyawati, Y. (2019). Regulasi Diri Mahasiswa Ditinjau Dari Keikutsertaan Dalam Suatu Organisasi. *EMPATI-Jurnal Bimbingan Dan Konseling*, *6*(1), 245–259. https://doi.org/10.26877/empati.v6i1.4115

Shah, P. E., Weeks, H. M., Richards, B., & Kaciroti, N. (2018). Early childhood curiosity and kindergarten reading and math academic achievement. *Pediatric Research*, *84*(3), 380–386. https://doi.org/10.1038/s41390-018-0039-3

Sriwahyuni, E., Asvio, N., & Nofialdi, N. (2017). Metode Pembelajaran Yang Digunakan Paud (Pendidikan Anak Usia Dini) Permata Bunda. *ThufuLA: Jurnal Inovasi Pendidikan Guru Raudhatul Athfal*, *4*(1), 44. https://doi.org/10.21043/thufula.v4i1.2010

Sudono, A. (2000). *Sumber belajar dan alat permainan untuk pendidikan anak usia dini*. Grasindo.

Sumardi, S., Rahman, T., & Gustini, I. S. (2017). Peningkatan Kemampuan Anak Usia Dini Mengenal Lambang Bilangan Melalui Media Playdough. *Jurnal Paud Agapedia*, *1*(2), 190–202. https://doi.org/10.17509/jpa.v1i2.9359

Supriaji, U., & Soliyah, S. (2021). Upaya Meningkatkan Kemampuan Mengenal Angka Melalui Pendekatan Realistik Matematik Education (Rme) Pada Anak Usia 5-6. *Jurnal Kridatama Sains Dan Teknologi*, *03*(01), 1–12.

Suseno, P. U., Ismail, Y., & Ismail, S. (2020). Pengembangan Media Pembelajaran Matematika

Video Interaktif berbasis Multimedia. *Jambura Journal of Mathematics Education*, *1*(2), 59–74. https://doi.org/10.34312/jmathedu.v1i2.7272

Sutama, I. W., Astuti, W., Pramono, P., Ghofur, M. A., N., D. E., & Sangadah, L. (2021). Pengembangan E-Modul "Bagaimana Merancang dan Melaksanakan Pembelajaran untuk Memicu HOTS Anak Usia Dini melalui Open Ended Play" Berbasis Ncesoft Flip Book Maker. *SELING: Jurnal Program Studi PGRA*, *7*(1), 91–101. http://www.jurnal.stitnualhikmah.ac.id/index.php/seling/article/view/736

Syah, M. (2003). *Pendekatan pembelajaran Pendidikan Matematika*. Remaja Rosdakarya.

Taman, D. I., Cimahi, K. K., Masa, P., & Covid, P. (2020). *Jurnal tunas siliwangi*. *6*(2), 51–62.

Utami, N. R., & Warmansyah, J. (2019). Cerita gambar berseri untuk meningkatkan hasil belajar sains di lembaga paud Yogyakarta. *Jurnal Tunas Cendekia*, *2*(2), 89–100.

Utami, R. W., Endaryono, B. T., & Djuhartono, T. (2020). Meningkatkan Kemampuan Berpikir Kreatif Matematis Siswa Melalui Pendekatan Open-Ended. *Faktor : Jurnal Ilmiah Kependidikan*, *7*(1). https://doi.org/http://dx.doi.org/10.30998/fjik.v7i1.5328

Utami, S. Y., Muawwanah, U., & Moha, L. (2023). Implementation of Loose Part Media to Increase Creativity in Early Childhood. *Indonesian Journal of Early Childhood Educational Research*, *1*(2), 87–96. https://doi.org/10.31958/ijecer.v1i2.8157

Utoyo, S., & Arifin, I. N. (2017). Model Permainan Kinestetik Untuk Meningkatkan Kemampuan Matematika Awal Pada Anak Usia Dini. *JPUD - Jurnal Pendidikan Usia Dini*, *11*(2), 323–332. https://doi.org/10.21009/JPUD.112.10

Van Herwegen, J., Costa, H. M., Nicholson, B., & Donlan, C. (2018). Improving number abilities in low achieving preschoolers: Symbolic versus non-symbolic training programs. *Research in Developmental Disabilities*, *77*, 1–11. https://doi.org/10.1016/j.ridd.2018.03.011

Warmansyah, J., Sari, R. N., Febriyani, E., & Mardiah, A. (2022). The Effect of Geoquarium Magic Educational Game Tool on The Ability to Recognize Geometry Shapes in Children 4-5 Years Old. *The 6th Annual Conference on Islamic Early Childhood Education*, *2017*, 93–100.

Warmansyah, J., Zulhendri, Z., & Amalina, A. (2021). The Effectiveness of Lore Traditional Games Towards The Ability to Recognize The Concept of Numbers on Early Childhood. *Ta'dib*, *24*(2), 79. https://doi.org/10.31958/jt.v24i2.2685

Weller, S. C., Vickers, B., Bernard, H. R., Blackburn, A. M., Borgatti, S., Gravlee, C. C., & Johnson, J. C. (2018). *Open-ended interview questions and saturation*. 1–18.

Widyastuti, N. S., & Pujiastuti, P. (2014). Pengaruh Pendidikan Matematika Realistik Indonesia (PMRI) Terhadap Pemahaman Konsep Dan Berpikir Logis Siswa. *Jurnal Prima Edukasia*, *2*(2), 183. https://doi.org/10.21831/jpe.v2i2.2718

Wijaya, A. (2011). *Pendidikan Matematika Realistik Suatu Alternatif Pendekatan Pembelajaran Matematika*. Graha Ilmu.

Wulandani, C., Afina Putri, M., Indah Pratiwi, R., & Sulong, K. (2022). Implementing Project-Based Steam Instructional Approach in Early Childhood Education in 5.0 Industrial Revolution Era. *Indonesian Journal of Early Childhood Educational Research (IJECER)*, *1*(1), 29–37. https://doi.org/10.31958/ijecer.v1i1.5819

Wulandari, N. P. R., Dantes, N., & Antara, P. A. (2020). Pendekatan Pendidikan Matematika Realistik Berbasis Open Ended Terhadap Kemampuan Pemecahan Masalah Matematika Siswa. *Jurnal Ilmiah Sekolah Dasar*, *4*(2), 131. https://doi.org/10.23887/jisd.v4i2.25103

Yanti, D., Widada, W., & Zamzaili. (2018). Kemampuan Pemecahan Masalah Open Ended

Peserta Didik Sekolah Negeri Dan Swasta Dalam Pembelajaran Matematika Realistik Berorientasi Etnomatematika Bengkulu. *Jurnal Pendidikan Matematika Raflesia*, *3*(1), 203–209. https://doi.org/https://doi.org/10.31186/jpmr.v3i1.6284

Yilmaz, Z. (2017). *Young Children s Number Sense Development : Age-Related Complexity across Cases of Three Children*. *9*(June), 891–902.

Zhou, N., & Yadav, A. (2017). Effects of multimedia story reading and questioning on preschoolers' vocabulary learning, story comprehension, and reading engagement. *Educational Technology Research and Development*. https://doi.org/10.1007/s11423-017-9533-2

Zulkarnain, I., & Amalia Sari, N. (2016). Model Penemuan Terbimbing dengan Teknik Mind Mapping untuk Meningkatkan Kemampuan Pemahaman Konsep Matematis Siswa SMP. *EDU-MAT: Jurnal Pendidikan Matematika*, *2*(2), 240–249. https://doi.org/10.20527/edumat.v2i2.619