

Realistic Mathematic Education (RME) Approach Assisted By Time Board Displays on The Mathematical Cognitive Abilities of Elementary School Students.

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ABSTRACT

This research is motivated by the low ability of elementary school students in mathematics subjects, especially mathematical cognitive abilities, so an approach is needed to provide the right solution to this problem. The aim of this research is to find out how much influence the Realistic Mathematic Education (RME) approach assisted by time board teaching aids has on students' mathematical cognitive abilities. The research method used is an experimental method with a quasi-experimental approach, with a pretest-posttest control group design, with comparative test analysis techniques for the experimental class and the control class. The results of this research showed that the average pretest score for mathematical cognitive abilities in the experimental class was 67.68 and the average posttest score was 90.77 and the N-Gain score was 68.34% with the effectiveness category being quite effective, while in the control class the average pretest score was 64.74 and posttest. 71.48 and an N-Gain score of 16.36% in the effectiveness category, namely not effective. Meanwhile, the results of the comparative test stated that the value of $t = 11.62$ with Sig. (one-sided p and two-sided p) $0.00 < 0.05$ then H_0 is rejected, which means that there is an influence between the Realistic Mathematic Education (RME) approach assisted by time board teaching aids on the mathematical cognitive abilities of class III students at SDN Cinere 1. By implementing the RME approach it is hoped that Students are more active and confident in expressing their opinions during discussions, exchanging ideas to understand and solve problems, so that mathematical cognitive abilities increase.

Keywords: *Realistic Mathematical Education (RME) Approach, Time Board Teaching Aids, Mathematical Cognitive Abilities.*

INTRODUCTION

Mathematical cognitive abilities are a discourse that is often the main topic in several mathematics research. This is caused by students' low ability to understand, apply and analyze the mathematical material being taught. Osterholm found that students had difficulty articulating mathematics reading (Pratiwi, 2015).

Students' cognitive abilities will influence how they think and solve problems faced by students and problem-solving abilities are a basic ability that students must have (Susanti, 2018). Students' mathematical cognitive abilities are important because they develop a rational attitude and are able to choose the best solutions for the students themselves (Farid, et al, 2019). This is the basis for solving life problems faced by students, this is what Jena (2014) stated that the way students learn, and handle problems really depends on the relationship between the student's personality and cognition (Nurmutia, 2019).

Learning mathematics is a basic and main subject because it demands and guides students in understanding and solving problems in their lives. Mathematics is a very strategic subject in developing students' basic abilities, especially numerical abilities which are really needed in everyday life both in society and elsewhere. Therefore, a good understanding of mathematical concepts will help students solve several problems in everyday life (Prastyo, 2020).

Based on observations of teachers who teach mathematics subjects at SDN Cinere 1, students' activities are less involved in the learning process, such as explanations from teachers who are monotonous or still use the lecture method in mathematics learning. It is known that teachers also do not use teaching aids during the learning process. Observation results also show that grades in class III mathematics subjects at SDN Cinere 1 for the 2022/2023 academic year are still very low, as many as 23 out of 31 students scored below the Minimum Completeness Criteria (KKM) in mathematics subjects because they are subjects that are not liked by most students who are considered difficult and boring. Students find it complicated when solving math problems where the solution requires using a formula first, they also have difficulty finding math questions in the form of stories. Students seem unable to determine the right type of solution to answer the question because they cannot yet understand and identify the problem raised by the question. This shows a fact regarding the majority of students whose ability to think and solve problems is still relatively low, while this ability must be developed because it is an indicator of mathematical cognitive ability. The cognitive domain taxonomy (Anderson & Krathwohl in Susanti, 2018: 73) includes six categories, namely: 1) remembering; 2) understand; 3) apply; 4) analyze; 5) evaluate; 6) create.

Elementary school age children ranging from 7 to 11 years old tend to be at the concrete operational stage. At this stage, elementary school age children are able to reason logically about things that are real (Putra et al., 2022: 70). To optimize students' mathematical cognitive abilities, especially in mathematics subjects. Of course, teachers must apply an effective learning approach by involving students in the teaching and learning process. Researchers feel that the Realistic Mathematic Education (RME) approach is suitable to be compared with real life. According to Susanto in Marselina (2019: 82-83) the Realistic Mathematic Education (RME) approach is an approach that teaches students that mathematics can be taught in a real way, but remains relevant to students' daily activities and learning experiences based on the real world. . In this learning, it has a significant impact on increasing students' understanding of the material being taught. RME also has basic principles as according to Gravemeijer in Natalia (2017: 91-92), namely: (1) Guided reinvention through progressive mathematization, (2) didactic phenomena (didacting phenomenology), (3) Model self-developed (self-developed model).

Ariyanti in Pebriana (2017: 74) believes that RME is able to grow students' knowledge, the learning atmosphere becomes encouraging because it involves students' real-world environment, thereby encouraging students to think critically and express their thoughts. Based on the advantages of RME, researchers intend to apply this learning approach to overcome the difficulties of class III students at SDN Cinere 1 regarding material about counting hours. In an effort to help students develop their cognitive abilities, so that learning material is easier to understand, researchers use time board teaching aids as a complement to the RME approach. RME is a learning approach developed by Hans Frudental who sees mathematics as an everyday human activity such as problem solving, organizing problems (Widiyastuti and Pujiastuti, 2014). In Indonesia, the term RME is known as PMRI or the Indonesian realistic mathematics approach, which is a mathematics learning approach that utilizes the real world or concrete objects close to students as learning aids. PMRI will really help students understand mathematics material which is relatively difficult and has a lot of

processes, because PMRI is context-based and real, so it is easier for students to understand (Sari, 2017).

A time board is a prop that is similar in shape and use to a wall clock. Wall clocks have a machine, which is different from time display devices which do not have a clock machine, but they have something in common, namely that there is a clock hand to tell the time (Rohmawati, 2019: 16). Different from clocks in general, the time display device for this research was made in the shape of a flower using MDF (Medium-density Fibreboard) wooden boards, namely wooden boards made from wood chips which are then processed to become solid. The circle shaped MDF wooden board is covered in colorful paper on which are attached numbers and 2 clock hands made of cardboard or thick paper, then the numbers are given different colored cells so that it makes it easier for students to count every second and minute as a timer. As a board or flower stem which also uses a MDF wooden board shaped into a long chain. The advantage of the time board visual aids is that the colors are varied and varied so that they can be interesting and increase students' attention, so they don't get bored while the lesson is taking place. This time board display tool can make it easier to present hourly material. Time board media can be an alternative choice in solving problems that can present a concrete form of calculating time (Putra, 2023).

METHOD

The research method used in this research is *elkspelelmeln*, with a quasi approach (Quasy Design), the reason the researcher used the Quasy Experiment research *meltdelt* was because it did not carry out random sampling (Randolm Assignmelnt) in its implementation but instead utilized groups that already existed or had already been formed. The research design used was a pretest-posttest control group design, meaning that the researcher carried out a pretest and posttest on groups that had been formed, both experimental groups and control groups. The number of students in each class is 31 students. Meanwhile, data collection techniques in this research are essay tests, observation and documentation. And the data analysis techniques used are descriptive statistical techniques such as Mean, Variance, tables and graphs which support the presentation of data. Meanwhile, to test the hypothesis from the experimental results, the N-gain test and the T-Independent sample test were used with the help of SPSS software.

RESULTS AND DISCUSSION

Result

This research aims to see the effect of the RME approach assisted by time board teaching aids on the mathematical cognitive abilities of grade 3 elementary school students at SDN Cinere 1. Based on the results of data analysis on the average mathematical cognitive abilities of students in the experimental and control classes, the experimental class pretest score was 67.68 and the control class 64.74, this has a small deviation, meaning that the initial abilities of students in both the experimental class and the control class are relatively the same in terms of students' mathematical cognitive abilities. This can be seen in the table below:

Table 1: Pretest Mathematical Cognitive Ability Test Results

Parameter	Eksperimen	Control
Mean	67.68	64.74
Standard Deviation	9.435	7.554
Variance	89.359	57.056
Responden	31	31

Meanwhile, in the results of the analysis of the average posttest score for the two groups, the experimental class obtained 90.77 and the control posttest average score was 71.48. This illustrates that there is quite a significant difference after the results of the treatment in the form of using the RME approach based on time board teaching aids on the mathematical cognitive abilities of elementary school students at SDN Cinere 1 Depok, West Java, this can be seen in the table below:

Table 2: Descriptive statistics of elementary school students' mathematical cognitive abilities posttest scores

Parameter	Experimen	Control
Mean	90.77	71.48
Standard Deviation	5.971	7.052
Variance	35.647	49.752
Responden	31	31

The N-Gain value is in accordance with the interpretation classification if the average value in the experimental class is $N\text{-Gain } 56 < 68.3439 < 75$ with the effectiveness category being quite effective. Meanwhile in the control class $16.3695 < 40$ in the effectiveness category is not effective. Thus, the average value of N-Gain for mathematical cognitive abilities in classes treated with the Realistic Mathematic Education (RME) approach assisted by time board props is better than in classes with the conventional approach as seen in the table below:

Table 3. Recapitulation of N-Gain Results

Class	Pretest	Posttest	Skor N-Gain	Category
Experimen	67.68	90.77	68.3439	effective
Control	64.74	71.48	16.3695	Not effective

Based on the results of the analysis of hypothesis testing with an independent sample test, the value of $t = 11.62$ was obtained, with a significance value of $0.001 < 0.005$, then H_0 was rejected, which means that there is an influence between the Realistic Mathematic Education (RME) approach assisted by time board teaching aids on the mathematical cognitive abilities of class III students at Cinere Elementary School. 1. The independent sample test can be seen in the table below:

Tabel 4: Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	T	df	Sig. (2-sided)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Nilai									
Equal variances assumed	.195	.660	11.62	60	.001	19.92	1.66	15.97	22.61
Equal variances not assumed			11.62	58.41	.001	19.92	1.66	15.97	22.61

The results of data analysis obtained from research conducted at SDN Cinere 1 show that the mathematical cognitive abilities of class III B students, totaling 31 students as an experimental class who were given the Realistic Mathematic Education (RME) approach treatment assisted by time board teaching aids, were better than cognitive abilities. mathematics class III C students totaling 31 students as a control class with a conventional approach. This affects mathematical cognitive abilities because in the principles of the RME approach it provides opportunities for students to understand and process the rediscovery of mathematics itself. According to everyday problems that students often see and feel. By forming a discussion group consisting of 4 groups, each group contains 7 to 8 students. In line with the opinion of Shudur (2019: 338), states that the advantage of group learning is that students can be more active in the learning process, students have the skills to ask questions in discussing a problem, can develop leadership talents and teach discussion skills, which of course can also improve mathematical cognitive abilities. student.

Apart from providing opportunities for students to reason by discovering mathematical concepts for themselves in solving problems, there is an influence due to the support of the time board props used in the research. Teaching aids can make students play an increasingly active role in the learning process, what the teacher explains can be clearer, as a result students understand more quickly and understand more easily. It can also improve students' mathematical cognitive abilities to channel their expressions, carry out trials or experiments.

Discussion

The RME approach in this research has a significant influence on the mathematical cognitive abilities of elementary school students with the help of teaching aids. The RME approach is very effective in learning mathematics, especially using visual aids or concrete media that are close to students so that relatively difficult mathematical material is easily understood well. In terms of improving students' mathematical abilities, teachers must orient students to real problems that must be solved with the help of teaching aids. This habit will increase students' abilities in analyzing, designing, reducing, determining appropriate alternative solutions to solve mathematical problems.

The statistical test results of this research show that the Realistic Mathematic Education (RME) approach at SDN Cinere has generally increased cognitive abilities after being given the Realistic Mathematic Education (RME) approach assisted by time

board props. The pretest and posttest results provide quite significant improvements. The average pretest score for students in the pretreatment experimental class was 67.68, while the average posttest score for the posttreatment experimental class was 90.77. This result looks significant before and after treatment. Therefore, learning using the Realistic Mathematic Education (RME) method with the help of time board props generally makes students interested and enthusiastic about learning mathematics. It can be interpreted that the Realistic Mathematic Education (RME) method assisted by board props during the experimental class has a significant positive effect on the mathematical cognitive skills of grade 3 students at SDN Cinere 1.

CONCLUSION

Based on the results of data analysis, there is an influence on students who study using the Realistic Mathematic Education (RME) approach assisted by time board teaching aids on students' mathematical cognitive abilities compared to students who study using the conventional approach. This is based on the results of t-test calculations with the help of SPSS version 29 software which have been carried out by researchers, that the tcount value of 11,624 is greater than ttable 2,000. With an N-Gain score of 68.34%, it has high performance, which is quite good in the experimental class, while the control class has 16.36% high performance, which is not very good. Based on this, it can be said that the mathematical cognitive abilities of the experimental class are better than the control class

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