

# Effect of Realistic Mathematics Education (RME) Approach and Initial Ability of Students to the Problem Solving Ability of Class 4<sup>th</sup> Student

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**Abstract** This study aims to determine the effect of the approach and Conventional approach and initial ability of students to the problem solving ability of students of Elementary School. This research was conducted in the fourth grade Elementary School 07 Metro City. The study is designed using analysis of variance 2 lanes. The results of this study were (1) the difference in mathematical problem solving abilities of elementary school students who learn to use the Realistic Mathematics Education (RME) approach among students who studied using conventional approach. (2) The interaction between the learning approach and students' initial ability to problem-solving ability Mathematics of Elementary School Students. (3) Ability to problem solving Mathematics Elementary School students between students learning by using the Realistic Mathematics Education (RME) approach which have high initial capability is higher than the students who learn using conventional approach that have high initial ability. (4) The ability of Mathematics problem solving of elementary school students between the students learn to use the Realistic Mathematics Education (RME) approach which has a lower initial ability is lower than the students who learn using conventional approaches that have lower initial ability.

**Keywords:** *The Realistic Mathematics Education (RME) Approach, the conventional approaches, Capability Earlier, Mathematical Problem Solving Ability*

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## 1. Introduction

The role of mathematics is very large in people's lives. The magnitude of the role of the mathematical sciences requires the student should be able to master mathematical concepts and apply it in solving problems in everyday life. Patterns in mathematics is not only found in numbers and equations, but also in every thing around us [8].

The main difference with a mechanistic approach and structuralistic is that the Realistic Mathematics Education (RME) does not start from abstract principles or rules with the aim of learning to implement this in concrete situations, also does not focus on the kind of instrumental knowledge [6].

Problem solving ability is the ability to solve the problem of routine, non-routine, regularly applied, applied non-routine, non-routine applied, and the problem of non-regular non-applied research in the field of mathematics [11]. Problems solving often refers to modeling [9].

Polya made four steps that can be used for the settlement of the problem: (1) Understanding the problem, (2) Devise strategies, (3) Implement the strategy, (4) Listening back. Based on the explanation inferred mathematical problem solving ability is the ability of solving problems / questions using the mathematical

problem solving strategy starts from understanding the problem, designing a strategy, implementing strategies, and reexamine [3].

Realistic Mathematics Education (RME) which is intended in this case is of school mathematics performed by placing the realities and experiences of students as starting point of learning [11]. There are five characteristics of Realistic Mathematics Education (RME), namely (1) Use of context, (2) The use of mathematical models for progressive, (3) Utilization of the results of student construction, (4) Interactivity, (5) Linkage [9].

The conventional approach appropriates to teach the concept of the problems that arise [10]. Based on the understanding that was concluded that the conventional approach is an approach that combines several methods including lectures, exercises, and the provision of duty where this approach refers in psychology behavioristik and more emphasis on learning strategies centered to teacher than strategy centered learning to student.

Learning has four components, namely analysis field of study, diagnosis of early ability students, the learning process, and the measurement of learning outcomes [7]. Uno explained that the initial capabilities play an important role in improving the meaningfulness of learning, which in turn had an impact in facilitating the internal processes that take place in the student when studying [7]. Based on the expert opinion on the notion

initial capability is the ability possessed by previous learning experience of students and facilitate the learning process of students next in learning mathematical problem solving.

The purpose of this study is:

1. To know the difference between the Mathematical Problem solving ability of students who use the approach Realistic Mathematic Education (RME) and between students using conventional approaches.
2. To determine the effect of interaction between the learning approaches and the ability of students to the beginning of mathematical problem solving ability.
3. To determine differences in mathematical problem solving abilities between students who have high initial capability using RME approach and by using conventional approaches.
4. To determine differences in mathematical problem solving abilities among the students who had lower initial ability to use RME approach and by using conventional approaches.

And the benefits of this research is:

Theoretically the results of this study are expected to increase knowledge useful for teachers in elementary school mathematics. The results of this study can add references to appropriate learning approaches in mathematics in primary school, especially learning approach that allows students to learn effectively. Additionally, the need to position their performance assessment of students at once improvement of teaching and learning process in improving the quality of student learning in this mathematical problem solving ability.

For education practitioners can be used as a reference to develop an approach to learning and assessment for achieving success in the learning process, especially for the researchers themselves. Teachers are able to understand the importance of selecting learning approaches and assessment in mathematics.

## 2. Methods

The research was conducted in classes IV A, IV B in the State Elementary School 07 Metro City Lampung

Province in January 2017. the number of students as many as 60 students. 30 students to experiment class and 30 students to control class

The method used in this study is an experimental method that uses the draft design of treatment by 2x2, by using this experiment the researchers tried to approach Realistic Mathematics Education (RME) with the conventional approach, the study subjects were divided into four classes, namely the experimental class and control class. Experimental class was taught by the approach of Realistic Mathematics Education (RME) and the control class was taught by conventional approach of learning methods, while the variable attributes are classified into high and low initial capability.

Table 1. Research Design treatment by level 2x2

	Variable X <sub>1</sub> Variable X <sub>2</sub>	The RME approach (A1)	The conventional approaches (A2)
Ability early	High (B1)	A <sub>1</sub> B <sub>1</sub>	A <sub>2</sub> B <sub>1</sub>
	Low (B2)	A <sub>1</sub> B <sub>2</sub>	A <sub>2</sub> B <sub>2</sub>

To analyze the data in this study used a technique of analysis of variance (ANOVA) with two lanes treatment by level design 2 x 2. To test the hypothesis can be implemented it is necessary to test the requirements analysis tests of normality and homogeneity test. Existing data is processed so that the meaning is benefits to answer the problems in research and to test the hypothesis. Hypothesis testing is performed in this study using techniques of research hypothesis test analysis of variance (ANOVA) two lanes. Further follow-up test was used to determine the interaction between the two variables causes using Tukey test. Tests conducted at significance level  $\alpha = 0,05$ .

## 3. Results

Results Ability Mathematical Problem Solving can be achieved because teachers perform learning tasks, assign the task of learning, and evaluate student learning outcomes. The following description of the data and the calculation results of the research results:

Table 2. Description of research data value X and A

Approach CapabilityInitial	RME (A1)		Conventional (A2)		Total	
	Information	Score	Information	Score	Information	Score
High (B1)	$n_1 =$	10	$n_2 =$	10	$n_{b1} =$	20
	$\Sigma X_1 =$	342	$\Sigma X_2 =$	274	$\Sigma X_{b1} =$	616
	$\Sigma X_1^2 =$	11804	$\Sigma X_2^2 =$	7692	$\Sigma X_{b1}^2 =$	19 496
	$x_1 =$	34.20	$x_2 =$	27.40	$x_{b1} =$	30.80
	$(\Sigma X_1)^2 =$	116 964	$(\Sigma X_2)^2 =$	75 076	$(\Sigma X_{b1})^2 =$	379 456
Low (B2)	$n_3 =$	10	$n_4 =$	10	$n_{b2} =$	20
	$\Sigma X_3 =$	279	$\Sigma X_4 =$	299	$\Sigma X_{b2} =$	578
	$\Sigma X_3^2 =$	7969	$\Sigma X_4^2 =$	9109	$\Sigma X_{b2}^2 =$	17078
	$x_3 =$	27.90	$x_4 =$	29.90	$x_{b2} =$	28 , 90
	$(\Sigma X_3)^2 =$	77 841	$(\Sigma X_4)^2 =$	89401.00	$(\Sigma X_{b2})^2 =$	334 084
Total	$n_{k1} =$	20	$n_{k2} =$	20	$n_i =$	40
	$\Sigma X_{k1} =$	621	$\Sigma X_{k2} =$	573	$\Sigma X_i =$	1194
	$\Sigma X_{k1}^2 =$	19773	$\Sigma X_{k2}^2 =$	16801	$\Sigma X_i^2 =$	36 574
	$x_{k1} =$	31.05	$x_{k2} =$	28.65	$x_i =$	29.85
	$(\Sigma X_{k1})^2 =$	385 641	$(\Sigma X_{k2})^2 =$	328 329	$(\Sigma X_i)^2 =$	1425636

Hypothesis of this study is inferential tested using Analysis of Variance (ANOVA) two way. In this study, there are two independent variables and one criterion variable. The independent variables are (1) A Learning Approach (RME and Conventional) and (2) Initial Capability (high and low). While the criterion variable is mathematics problem solving ability.

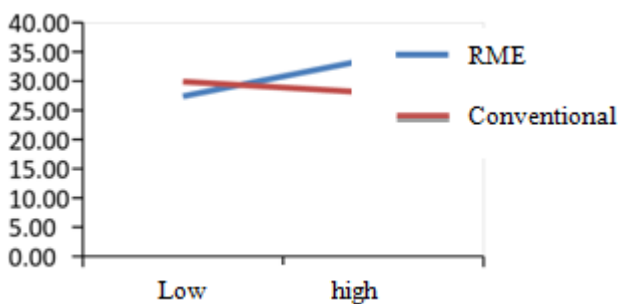
Based on these calculations in get the following results:

**Table 3. Results of Analysis of VarianceTwo Line**

VarianceSource	Db	JK	RJK	F <sub>count</sub>	F <sub>table**</sub>
Learning Approach	1	57.6	57.6	6732	4:11
Initial Capability	1	36.1	36.1	4,219	4:11
Interactions	1	193.6	193.6	22 629	4:11
Fallacy	36	308	8:56		
Total	39	595.30			

From the results of the above analysis, two variants can explain some of the following:

1. The results of analysis of variance between the two lines column shows the price of  $F_{count} = 6.73$  is greater than  $F_{table} = 4.11$  at significance level  $\alpha = 0.05$ . The case means  $H_0$  is rejected and accept  $H_1$ . Having proven the difference is significant, then the next step to see which is better mathematics problem solving abilities between the two treatments.  $H_0$  is initial hypothesis and  $H_1$  is alternative hypothesis. Based on the calculation turns out the average value of Mathematics problem-solving ability that got Realistic Mathematics Education approach ( $A_1$ ) was 31.05 greater than the mathematics problem solving ability that got Conventional approaches ( $A_2$ ) the average value of 28, 26.
2. Based on the analysis of variance of two lines between columns and rows show the price of the  $F_{count} = 22.629$  is greater than  $F_{table} = 4.11$  at significance level  $\alpha = 0.05$ . The case this means that  $H_0$  is rejected and accept  $H_1$ . Thus the second hypothesis which states there is interaction between learning approach and prior knowledge accepted very significant at  $\alpha = 0.05$ . Forms of interaction may be presented in Figure 1.



**Figure 1.** Graph of the interaction between learning approach and the initial capabilities

3. Based on the analysis of variance of two paths between rows indicate the price  $F_{count} = 4.219$  greater than  $F_{table} = 4.11$  at significance level  $\alpha = 0.05$ . The case means  $H_1$  received and reject  $H_0$ . Thus

the third hypothesis which states there is a difference Mathematical problem solving abilities significantly between students who have prior knowledge of high and low initial capability. Or in other words the problem-solving ability Mathematical have high initial capability with students who have a lower initial ability is different.

Results summary of the calculation of each pair of groups with Tuckey test can be presented in Table 4.

**Table 4. Test Results Continue with Tuckey Test**

No.	HipotesisStatistik	Q <sub>Calculate</sub>	Q <sub>table</sub> ( $\alpha = 0.05$ )
1	$\mu A_1 B_1 > \mu A_2 B_1$	7,35 *	2,04
2	$\mu A_1 B_2 < \mu A_2 B_2$	2,16 *	2,04

Based on the results of a further test Analysis of Variance and Tuckey test above, it can be stated that:

1. The third hypothesis which states that the given problem solving capabilities approach Realistic Mathematics Education (RME) with high initial capability more of the given problem-solving ability Conventional approaches with lower initial ability, received significantly at  $\alpha = 0.05$ .
2. The fourth hypothesis which states that the ability of Mathematics problem solving approach given Realistic Mathematics Education (RME) with lower initial ability smaller than in mathematics problem solving ability given Conventional approaches with lower initial ability, acceptable.

### 4. Discussion

Discussion of results of testing hypotheses for further research are as follows:

#### Difference Capabilities Problem Solving Mathematics of Elementary School Students Who Learn Approach Using RME and conventional approaches ( $A_1$ and $A_2$ )

In this study it was found that there are differences in problem solving ability mathematics among a group of students given the approach of Realistic Mathematics Education (RME) with a group of students who were given conventional approach has a high initial ability. This is evidenced by Tukey test obtainable  $Q_h$  larger  $Q_t$  or  $7,35 > 2,04$  at  $\alpha = 0.05$ .

This is because Realistic Mathematics Education or realistic mathematics education was born in the Netherlands by Freudenthal. Realistic mathematics education that is intended in this case is of school mathematics performed by placing the realities and experiences of students as the starting point of learning [11]. The problems realistically be used as a source of the emergence of mathematical concepts or formal knowledge to encourage the activity of problem solving, looking for problems, and organizing subject matter. With these characteristics required high starting capabilities for students to follow the lesson well.

In contrast to conventional approaches, the conventional approach of learning centered on the teacher, almost all learning activities controlled by the teacher. The whole system is geared to the series of events that neatly in educational institutions, without any attempt to find and

apply different learning approaches appropriate to the theme and to learning disabilities every individual. This corresponds well with the conventional approach according to which strategies teacher centered [2].

Based on the above explanation, the students with the approach Realistic Mathematics Education (RME) with high initial capability will get a higher score than students with Conventional approaches with high initial capability for RME approach is an approach to learning math using day-matter or context day in teaching mathematics and in line with the constructivist theory.

#### **Interaction between Early Learning Approach and the ability to Problem Solving Ability Students Math**

Second hypothesis which states that there is interaction between learning approach and the initial capabilities with proven problem solving ability mathematics, namely the obtained  $F_{count} = 22.629$  is greater than  $F_{table} = 4.11$ , Thus the provision of teaching and learning approaches should pay attention to students' initial ability.

In the more appropriate teaching methods/ approaches used, the more effective and efficient learning activities undertaken between teachers and students will ultimately deliver the support and success of student learning and success of teaching conducted by the teacher [5]. Students who have a high initial capability given approach Realistic Mathematics Education (RME) demonstrate mathematical problem-solving abilities were greater than students who are given conventional approach. Conversely, students who have a lower initial ability given RME approach demonstrate problem solving skills Math were smaller than students who are given conventional approach. This suggests that in providing appropriate learning approach should pay attention to students' initial ability.

#### **Ability Problem Solving Math Students are given RME has the ability Early High with conventional approaches have the ability Early High**

Study hypothesis which states that the problem solving capabilities of Mathematics in the group of students who have prior knowledge given height approach Realistic Mathematics Education (RME) is larger than the group of students Conventional approaches given. This is evidenced by Tukey test track obtainable  $Q_h$  larger  $Q_t$  that is  $7,35 > 2,042$  at  $\alpha = 0.05$ . This means  $H_1$  received and reject  $H_0$ . Thus the third hypothesis which states that the given problem solving capabilities approach Realistic Mathematics Education (RME) with high initial capability is greater than the ability of Mathematics problem-solving group given conventional approaches with high initial ability, received significantly at  $\alpha = 0.05$ . So that students who have a high initial capability using an approach Realistic Mathematics Education (RME) is higher compared with students who have a high initial capability with conventional approaches.

Initial capability crucial role in improving the meaningfulness of teaching, which in turn had an impact in facilitating the internal processes that take place within the students when learning [7].

Approach *Realistic Mathematics Education* (RME) and Conventional may have a varying effect when viewed from the initial capabilities of the students. Approach *Realistic Mathematics Education* (RME) put forward and demanding activity of students in learning. Teacher serves

as a facilitator and a dynamic so that learning can take place more enjoyable.

#### **Ability Problem Solving of Studentsof Elementary School were given treatment with the approach RME has the ability to lower initial with conventional approaches have the ability to lower initial**

Study hypothesis which states that the problem solving skills Math Students in the group of students who have the ability to lower initial given approach Realistic Mathematics Education (RME) smaller than a given group of students who received conventional approach. This is evidenced by Tukey test track obtainable  $Q_h$  larger  $Q_t$  or  $2.16 < 2.042$  at  $\alpha = 0.05$ . This means  $H_1$  received and reject  $H_0$ . Thus the fourth hypothesis which states that the problem-solving ability Mathematical given approach Realistic Mathematics Education (RME) with the ability to lower initial get a score less than the ability of problem solving Mathematical given approach Conventional early ability is low, received significantly at  $\alpha = 0, 05$ . So that students who have the ability to lower initial approach Realistic Mathematics Education (RME) is lower compared to students who had low initial capability with conventional approaches.

Students who already have a low initial ability to have less initiative with or without the help of others, in determining learning needs, define learning goals, determine the learning facility, selecting and applying appropriate learning strategies and assess learning outcomes [1]. With these characteristics, it is suitable to be applied to students who have a low learning independence is where the Conventional approaches to this approach students can learn from topics or material that has been determined by the teacher.

Based on the hypothesis fourth prove the theory that wherever possible the use of learning approaches not only as a tool to improve student mathematics problem solving abilities, meaning that learning approaches are also used to improve the quality of teaching in the classroom [2].

Another factor that led to elementary school students who have the ability to lower initial difficulties in the learning process by using the approach of *Realistic Mathematics Education* (RME) is the study of mathematics that uses the problems of realistic as the source of the emergence of mathematical concepts or formal knowledge can encourage activity completion problem, looking for problems, and organizing subject matter.

## **5. Limitations**

Time used in this study is limited to one month with eight meetings in the subject matter or materials are limited, so it may be just the frequency and duration of administration of relatively less material. Therefore, these results can not be the maximum in terms of time and subject matter. Further research needs to be done by using a longer time. With more in-depth material. This study uses a 2x2 factorial design of the design which only measures Math problem solving capabilities by providing external treatments such approach involves learning and internal attributes of the initial capabilities of existing research on the subject. Though there are many other internal or external attributes that could affect the ability

of Mathematics problem solving such as intelligence. Therefore, it is necessary to study further more comprehensive.

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