

The Effect of Realistic Mathematical Education Approach to Mathematical Learning Outcomes On Fraction Material for Third Grade Students

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ABSTRACT

This study was to determine the effect of applying realistic mathematical approaches to learning outcomes. This research is an experimental study with a quantitative approach, the method used is *quasi experimental*. The design of this study is *nonequivalent control group*. The subject of this research was third grade students of Artodung Pamekasan State Elementary School. The data collection technique is a test technique, the tests used in the form of *pretest* and *posttest* are in the form of multiple choices with the number of each of the 20 items. Test instruments were tested for validity and reliability before being used for research. After research, the results of the study were analyzed using the normality test, homogeneity test, and hypothesis testing. The results of the research conducted at Artodung Pamekasan State Elementary School obtained the results that there was an influence from the realistic mathematical approach to the mathematics learning outcomes of third grade students, this was evidenced by the increase in the average value of the experimental class learning outcomes greater than the control class $22.5 > 16.06$. Besides that, it is also proven by the results of $-t_{hitung} < -t_{tabel}$ at the 5% significance level located in the negative H_0 rejection area, which is $-2.195 < -1.68107$. So it can be concluded that H_a is accepted and H_0 is rejected.

Keywords: realistic mathematical approaches, mathematical learning outcomes, fractions.

INTRODUCTION

Learning mathematics in elementary schools requires an innovation and creativity of the teacher in processing learning, for example by applying a learning approach that is fun for students or by using media that is attractive to students. Not only that, the provision of real-world context problems that can be imagined by students can also support the learning process.

This is also adjusted to the thinking stage of elementary school students who are still in the concrete operational stage so that they still need the help of concrete objects or problems of real-world contexts that can be imagined by students to facilitate understanding the material presented.

There is an approach that can be applied to mathematics learning is *Realistic Mathematic Education (RME)* or commonly called Realistic Mathematics Education (PMR).

The PMR approach was developed by Freudenthal in the Netherlands and received a fairly good response there, besides that in America also had implemented PMR in a number of schools and obtained good results. According to Romberg & de Lange (in Hadi, 2005: 8).

In addition to the translation of PMR, fractions are an important problem in research. Fractions are a product of a part of a number that cannot be expressed in a number so it must use fractions. Fractions are interpreted as part of something intact (Heruman, 2007: 43).

The researcher made observations at Artodung Pamekasan State Elementary School to find out whether there was any influence "Effect of Realistic Mathematics Education Approach (PMR) on Mathematics Learning Outcomes of Fractions". In this school the media constraints used are not media that are often encountered by students but manipulative media in the form of circular or rectangular images with some shading in some parts which later students are asked to determine the size of the fraction indicated by the flat build. Besides that, the use of media tends to be only when planting the initial concept, then when the material deepens the teacher does not always use the media. Learning that has been carried out has used several examples of real world context problems, but unlike PMR here the problem of world context is not used as a starting point in learning but only as an example of students' description. This is evidenced by student learning data, namely the low semester exam results that have not yet reached KKM, which is 75. Of the 25 students only 10 students meet KKM while the rest are still below the KKM.

In 2017 the realistic mathematical approach was examined in Banjarjo 1 Bojonegoro by Desi Wulandari, who stated why this realistic mathematical approach can be said to be important, this is due to the inaccuracy of a teacher in applying a learning approach during the teaching and learning process resulting in fatal learning. can only cause students to fail in achieving learning goals. in this fraction material students are required to understand an abstract concept. therefore to introduce this material, it needs to be linked to the real world context or concrete things so that there is no misconception. one way to deal with it according to researchers is to apply a realistic mathematical approach to be able to help students to be able to understand how fractions.

Characteristics of PMR 1. Use of context The real world context, in PMR is used as a starting point in mathematics learning. 2. The use of models for progressive mathematicians, the model in PMR serves to bridge in changes from concrete mathematics to formal or more abstract mathematics. 3. Utilization of student construction results, Students play an active role in the process of rediscovering mathematical concepts, this is evidenced by the freedom of students to develop problem-solving strategies based on students' own thinking. 4. Interactivity, Learning requires a communication between students and students with their teachers. 5. Linkages, mathematical concepts do not consist of separate parts, but are interrelated between concepts with one another.

thus this realistic mathematical approach is expected to be suitable to be used in this study with its characteristics that this learning approach can be used as a starting point for students to understand the fractions in which third grade is the beginning of fraction conceptualization and is a basis of fraction learning. besides that the realistic mathematical approach prioritizes the process and most importantly the material is associated with the real world context in the form of examples and a problem and then guided in discussions and in the end can provide solutions to the problems they obtain.

based on this background, the formulation of the problem in this study is how the influence of the realistic mathematics education approach (PMR) on the learning outcomes of mathematics in the fractions of third grade students of Artodung Pamekasan State Elementary School.

METHOD

The type of research used in this study is a type of experimental research. The type of quantitative research that will be applied aims to measure the influence of independent variables, namely the realistic mathematical approach and the dependent variable is the result of learning mathematics. The form of design in this study uses the *Pretest-Posttest Control Group Design* (Emzir, 2011,: 98).

The *Pretest-Posttest Control Group Design* can be described as follows.

Table 1. Research Design

Kelompok	Pretest	Variabel perlakuan	Post-test
Eksperimen	O1	X	O2
Kontrol	O3	-	O4

Source:(Sugiyono, 2016:76)

Information:

- O1 : *Pretest* results in the control group
- O2 : *Posttest* results in the experimental group
- O3 : *Pretest* results in the control group
- O4 : *Posttest* results in the experimental group
- X : Treatment

In the experimental group the learning was done by applying a realistic mathematical approach while the control group applied a conventional learning model.

In this study the research subjects were third grade students A and B class of Artodung Pamekasan State Elementary School. The research sample used was 20 students for the control class and 20 for the experimental class. The timing of the research is carried out approximately between March and April 2019 in the even semester 2018/2019.

There are two research instruments to be carried out in this study, namely: 1. Test sheets, in this test sheet containing questions about mastery of the material with almost the same level of difficulty, the test sheets in the test are in multiple choices with three answer choices, A, B, C with the number of questions as many as 20 questions. Questions were given to the experimental class which received treatment and control classes that were not treated. 2. This observation sheet aims to determine the extent of the influence of realistic mathematical approaches to student learning outcomes. The observations that will be made are the researcher acting as a beginner teacher in third grade, then the class teacher or peer researcher observes the implementation of the application of realistic mathematical approaches when learning takes place.

The techniques used to collect data by researchers are two: 1. Observation techniques, aiming to observe the teacher in carrying out the use of digital literacy when learning takes place in the experimental class and 2. The test technique aims to measure or know the progress of students during learning, there are two implementations in this test technique, namely the implementation of the pre-test and post-test.

Furthermore, after data collection techniques, data analysis techniques will be carried out using a quantitative approach to data presented in the form of numbers. The analytical technique of data used in relation to the quantitative approach is the calculation of answers to problem formulation and hypothesis presentation, which are held in two stages: Data analysis is divided into first, validity and reliability tests. 2. Analysis of the results data are normality test and hypothesis test

RESULT

The results of the study consisted of the results of expert validation, the results of research in the field, and the results of inferential analysis. The following are the results of the learning device validation and research instruments used in this study, which have been validated by experts, the following are the results of validated data.

Table 1. Results of Validation of Learning Devices and Research Instruments

Validation results	Average Validation Value	Category	Information
RPP	3,55	B / Valid	Can be used with revisions
LKPD	3,65	B / Valid	Can be used with revisions
Test Sheet (Pretest)	3,88	B / Valid	Can be used without revisions
Test Sheet (posttest)	3,88	B / Valid	Can be used without revisions

The validation results related to the RPP syllabus, LKPD, and Test Sheets both *pretest* and *posttest* in the table show the average feasibility validation of the four learning instruments and research instruments from the validator to get a good category, so it can be concluded that the learning device is feasible to use with little revision.

The following is the percentage of the comparison of Pre-test and Post-test scores

Pre-test and Post-test Value Results on learning outcomes

Amount of Value	1072	1859
Average Value	53,6	92,95

Source: processed data

For the results of the analysis of observations of experimental class student learning results showed that for the *pretest* results the average presentation was 53.6% with the medium category and for the *posttest* results the average presentation was 92.95% with a very high category. Based on the results of the analysis of the observations of the learning outcomes of the control class students for *pretest* and *posttest* in the control class and the experimental class there is an influence of the application of a realistic mathematical approach because there are very significant differences.

Pre-test and Post-test Value Results on learning outcomes

Amount of Value	811	1498
Average Value	40,55	74,9

Source: processed data

The results of student learning outcomes in the control class showed that for the *pretest* results the average presentation was 40.55% with less and for the *posttest* results the average presentation was 74.9% with sufficient categories. Based on the results of the analysis of learning outcomes for the control class for the *pretest* and *posttest* only at the stage of less and sufficient. In this case it has not shown good results.

From the table above, it can be seen that the comparison between the average pre-test value and the post-test value is higher post-test value.

Furthermore, the translation related to the normality test of data obtained from student learning outcomes and collaboration, the researcher used the *SPSS 21.00* program with the *kolmogorov-smirnov* technique at a significant level of 0.05. The selection of the *Kolmogorov-Smirnov* test because this technique can test in large or small quantities, besides that, the data in this study are interval scale or ratio.

The results of the normality test that has been processed are in table 4.13

Table 4.13

Normality Test Results

Variant	Class	Kolmogorov-Smirnov	Sig-
LKPD (<i>Pretest</i>)	Kontrol	0,583	0,886
LKPD (<i>Posttest</i>)		0,666	0,766
LKPD (<i>Pretest</i>)	Eksperimen	0,605	0,857
LKPD(<i>Posttest</i>)		0,692	0,724
Learning outcomes (<i>Pretest</i>)	Kontrol	0,912	0,377
Learning outcomes (<i>Posttest</i>)		0,671	0,759
Learning outcomes (<i>Pretest</i>)	Eksperimen	0,691	0,727
Learning outcomes (<i>Posttest</i>)		0,788	0,563

Source: processed data

Normality test data based on table 4.13 above obtained that, the results of the significance level of the collaboration variable and creative thinking of students in the control class and experimental class were more than 5% or 0.05. So based

on the acquisition, it can be concluded that the analysis requirements test has been determined because all data that has been obtained is normally distributed.

The homogeneity test carried out in this study aims to determine the similarity of the sample section. In the homogeneity test, researchers used the *SPSS 21.00* program with a *one way ANOVA test* technique at a significant level of 0.05. The homogeneity test results can be seen below.

Table 4.14
Homogeneity Test Results

Variable	Levene Statistic	df1	df2	Sig.
LKPD (<i>Pretest</i>)	1,489 ^a	5	12	0,264
LKPD (<i>Posttest</i>)	2,118 ^a	5	10	0,146
Learning outcomes (<i>Pretest</i>)	1,911 ^a	4	11	0,179
Learning outcomes (<i>Posttest</i>)	1,931 ^a	3	11	0,183

Source: processed data

Based on the acquisition of homogeneity test data in table 4.13, each variable gets more than 5%. Then concluded that the second sample homogeneous variance (H_0 is rejected) and requirements test analysis has been fulfilled.

Interpretation of the results of hypothesis testing data, the hypothesis of this study is "there is the influence of a realistic mathematical approach to the mathematics learning outcomes of third grade students of Artodung State Elementary School". The results of these hypotheses are tested from the results of the research data that has been conducted. This can be seen from the average score of the experiment class and control *posttest*. The results of research in A class of third grade are greater than the average score in B class of third grade. The average of A class of third grade students is 82.5 and the average of B class of third grade students is 71.7.

Based on the observations of table 4.13, it can be seen that the two classes that have been tested are the class that applies the realistic mathematical approach and the class applying conventional learning, the results of the significance level of the normality test for each of the two groups are obtained. Data on student learning outcomes (*pretest*) of 0.857 in the control class and in the experimental class of 0.866 while, at the time (*posttest*) in the control class of 0.766 and in the experimental class of 0.724. Because the two classes that have been tested have a significance value of 5 0.05, it can be concluded that the student learning outcomes data are normally distributed in each group.

Based on the observations of table 4.13, it can be seen that the two classes that have been tested are the class that applies the realistic mathematical approach and the class applying conventional learning, the results of the significance level of the normality test for each of the two groups are obtained. Data on the collaboration ability of students (*pretest*) is 0.857 in the control class and in the experimental class is 0.866 while, at the time (*posttest*) in the control class is 0.766 and in the experimental class is 0.724. Because the two classes that have been tested have a significance value of 5 0.05, it can be concluded that the student learning outcomes data are normally distributed in each group.

In table 4.16 shows that, the *mean* results of student learning outcomes at the time (*posttest*) amounted to 74,350 in the control class and experimental class at 92,950. While in table 4.16 for the results of the Independent Sample T-Test test about the influence of the realistic mathematical approach to student learning outcomes (*posttest*) the results obtained $t_{hitung} (6.747) > t_{tabel} (1.686)$ with *df*.38 at the 0.05 significance level. Because the significance level is 5 0.05 then H_0 is rejected while H_a is accepted. So, it shows that there are differences in critical thinking skills of students in the experimental class and in the control class at the time (*posttest*) because in the experimental class there is treatment that is by applying realistic mathematical approaches during learning and in the control class there is no treatment (treatment) given. Based on the results obtained, it can be concluded that the learning outcomes of students who apply realistic mathematical approaches are significantly higher than the learning outcomes of students who only apply conventional learning.

CLOSING

Based on the results of the discussion described above, it can be concluded that: There is an influence of the realistic mathematical approach to the learning outcomes of mathematics in the fractions of students in third grade Elementary School.

And suggestions from this research are Based on the conclusions that have been described above and the experience of researchers during the research, the suggestions that can be given are as follows:

1. Realistic mathematical approach in learning, can be used as a reference and alternative for teachers or educators to improve mathematics learning outcomes.
2. The researcher only examines the effect of realistic mathematical approaches on student learning outcomes. For researchers who want to research further with the same variable, it is expected that the material used is different so that the other material used can be seen from the analysis with the variables used.

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