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The Indonesian Realistic Mathematics Education Approach (PMRI) on Fraction Material to Improving Learning Outcomes of Class IV Students at SDN Mangunharjo

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ABSTRACT

In the learning activities of the fourth-grade students at SDN Mangunharjo, they had difficulty understanding learning material, especially fractional material. According to the results of interviews with the fourth-grade teacher, students experienced problems understanding multiplication resulting in learning outcomes under KKM 65. This research aimed to analyze the effectiveness of implementing the PMRI approach to optimizing the results of learning fraction material for class IV students at SDN Mangunharjo. The research method used is a quantitative method with a pre-experimental research design in the form of a one-group-pretest-posttest. Implementation of the PMRI approach with an initial trial of class V at SDN Kemijen 02 with as many as 28 students and a final tryout for class IV at SDN Kemijen 02 as the control class and class IV at SDN Mangunharjo as an experimental class. Techniques and data collection include questionnaires, observations, test questions, and documentation tested for validity, reliability, homogeneity, level of difficulty, and discriminatory power. Based on observations from observers, it showed that the implementation of the PMRI approach in the learning process from the second meeting was 88.75, and the third meeting increased by 91.75 these results were in the very good category. While the results of the posttest class classical completeness test were 82.93 out of 29 students with a percentage of 83%, for the pretest class 42.72 with a percentage of 0% of 29 students, none of the students achieved the minimum completeness criterion score. This data shows that the class with the learning process using the PMRI approach is better than the conventional or lecture learning process. It means that applying the PMRI approach can optimize the learning outcomes of fourth-grade students at SDN Mangunharjo.

Keywords: PMRI approach; Fractions; Learning outcomes

INTRODUCTION

Education includes everything that can provide new knowledge to be able to change individual attitudes to be better. Education that is truly organized will make children reach maturity and independence. The entire learning process goes hand-in-hand with the teacher intending to be able to foster a complete adult attitude towards children and get maximum results which cannot be separated from the role of a teacher and how a teacher can make children not bored in a class by utilizing learning resources or media which exists (Nurdiana *et al*., 2018).

The learning approach must be adapted to the characteristics of the child and the learning needs of the teacher, one approach that can be used is the Indonesian Realistic Mathematics Education (PMRI) approach. Pebriana, (2017) States that Indonesian

Realistic Mathematics Education (PMRI) is a theory in the process of learning mathematics with characteristics and basic concepts that are different from the others. PMRI is an adoption of Realistic Mathematics Education (RME) which was developed and adapted to the background of the State of Indonesia, where PMRI is not a copy-paste of RME, which has been developed in its home country. Arrafi & Masniladevi, (2020) States one approach to learning mathematics based on the mathematization of everyday experience by implementing mathematics in everyday life. So, the PMRI approach is a realistic learning approach using everyday experiences.

Mathematics is a universal science that underlies the development of modern technology and has an important role in various scientific disciplines and advances one's thinking power. Same opinion Najib *et a*l., (2018) development. Therefore, understanding mathematics requires a high level of concentration and practice working on questions to master each material. Mathematics subjects contain various materials that must be learned by children. The main obstacle is that the material for fractions is in different forms, the forms of fractions used are usually ordinary fractions, mixed fractions, decimal fractions, and percent fractions (Farida & Rahayu, 2017).

Learning outcomes include the results of the human learning process and human changes. The form of change is the result of learning in the form of changes in knowledge, attitudes, behavior, understanding, skills, and skills. Changes in the meaning caused by growth are not considered learning outcomes. Change as a result of learning is consistent and has the potential to develop (Lestari, 2014).

According to the results of interviews with grade IV teachers, students who achieved KKM scores were only 37% of 29 students. Grade IV students at SD Negeri Mangunharjo obtained learning outcomes less than KKM in Mathematics subject matter of fractions. In addition, in this learning process, the teacher also utilizes technology with the help of the internet network. However, in class IV, teachers still need to fully consider the appropriate approach for children. Teachers sometimes need to learn what approach to apply during learning activities.

Grade IV children are children who are able to think rationally, realistically and logically where children with a high sense of curiosity about something. At this age children have strong memories which begin to require active and creative learning (wahidah *et al*., 2020); (Hardiyan *et al*., 2019). So, high-aged children are children with the characteristics of being able to think concretely, in other words, in line with the approach that will be implemented in the learning process, namely the PMRI approach where this approach requires children to think creatively and actively.

Based on the description above, this research aims to analyze the effectiveness of implementing the PMRI approach to optimize the learning outcomes of fourth-grade students at SDN Mangunharjo.

MATERIALS & METHODS

The method used in applying the PMRI approach to the learning process is the quantitative method. This type of research is a Pre-Experimental Design with the form of One-Group Pretest-Posttest Design. The intended design has a pretest, thus the results of the treatment can be known more accurately because they can be compared with the conditions before being given treatment. Sampling with purposive sampling, for data collection with test techniques, observation, interviews, questionnaires, and documentation. The analysis used is the classical completeness test, the N-Gain test, and the t-test. The results of these tests will obtain quantitative data in the form of test results to determine the implementation of learning mathematics through the PMRI approach to improve learning outcomes.

RESULT

Implementation in the learning process will be adjusted to the observer's assessment using the learning process assessment sheet that has been prepared. Observer assessment is carried out by teachers and colleagues to assess the extent to which the mathematics learning process is based on the PMRI approach. The results of the value of the implementation of the learning process can be shown in table 1.

Table 1 Implementation of the Learning Process

No	Execution	Observer		Average	Percentage	Category
		I	II			
1	Meeting II	178	177	177,5	88,75	Very Good
2	Meeting III	183	184	183,5	91,75	Very Good

The results of the data presented in Table 1 can be obtained with information with the conclusion that the PMRI approach-based mathematics learning process implementation category showed positive results that fulfilled the very good category classification, namely at the second meeting with a percentage value of 88.75> 81 and at the third meeting the data were obtained. of 91.75 > 81, so that each of these meetings is categorized as very good.

Individual Completeness Test Results

The individual completeness test is used to determine student learning outcomes that have reached the KKM of 65 or have not fulfilled it. The hypothesis used in testing individual completeness:

H_0 : μ_0 < 65 (The average student learning outcomes using the PMRI approach is less than 65).

H_1 : $\mu_0 \geq 65$ (The average student learning outcomes using the PMRI approach are more than or equal to 65).

The valid completeness category is where H_0 ($t_{count} \geq t_{table}$) with dk = (n-1) the significance level used is 0.05, then H_0 is rejected. The results of the average test data with the One Sample t-test obtained an average value of ($\bar{x}$) 82.93 and standard deviation (s) 7.620 with a number of students (n) 28. The results of the individual completeness test scores can be seen in Table 2.

Table 2 Individual Completeness Test Value

	t_{count}	t_{table}
Class Eksperimen	1,701	12,6
Class Control	1,703	3,90

Data results Table 2 standard deviation with the normal category gets a t_{table} result of 1.701 with a significance level of 0.05. From the results of the standard deviation, $t_{table} < t_{count}$ (1.701 < 12.6) then H_1 is accepted and H_0 is rejected. So that students in the experimental class have fulfilled individual learning mastery namely 65, while in the control class the standard deviation value with the normal category t_{table} is 1.703 because $t_{table} < t_{count}$ (1.703 < 3.90) then H_1 is accepted and H_0 is rejected. Therefore, students in the control class have fulfilled the individual completeness of 65.

Results of the Classical Completeness Test

The purpose of using the classical completeness test in this study is to test whether students who achieve KKM (65) reach 75%. Test used in testing the z test. The hypothesis used in the classical completeness test is:

H_0 : π <75% (the ratio of mastery of student learning outcomes that meet the KKM, namely 65, has not reached a mastery value of 75%)

H_1 : $\pi \geq 75\%$ (the ratio of completeness of learning outcomes of students who meet the KKM, namely 65, has achieved a mastery value of 75%)

The test category that applies if $Z_{count} < Z_{table}$ then H_0 is accepted. The results of the data show that of the 29 students in the experimental class, none of the students who passed achieved a KKM score of 65 on the pretest score. After being given treatment using the PMRI approach, it was found that all students in the experimental

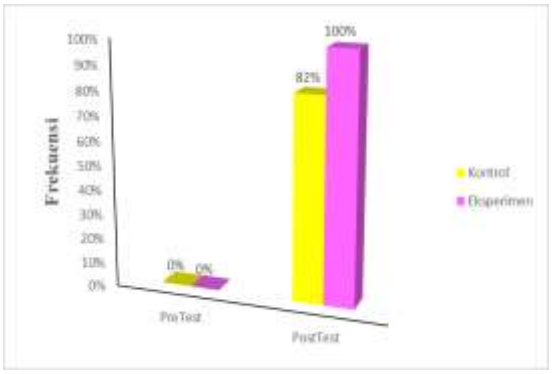
class who passed achieved a KKM score of 65 on the posttest score. whereas in the control class of the 28 students who were used as the research sample none of the students who passed achieved a KKM score of 65 on the pretest scores, then on the posttest scores the students who passed achieved a KKM score of 65 namely 24 students and 4 students did not pass achieving grades KKM (65). The conclusion of the results of the classical completeness test values can be shown in Table 3.

Table 3 Classical Completeness Test Value

Uji Z	Z_{table}	Z_{count}
Class Eksperimen	1,699	3,246
Class Control	1,701	0,909

The results of the data in Table 3 inform that the list of standard normal tables is obtained from the Z_{table} results of 1.699 with a significance level used of 0.05 because $Z_{count} > Z_{table}$ (3.246 > 1.699 then H_0 is rejected and H_1 is accepted. From these results it can be concluded that the ratio of learning outcomes experimental class or class students who have received treatment in the form of a learning process using the PMRI approach have met the minimum completeness criteria (KKM) 65 achieving more than 75%.

The results of the data in the control class or class where the learning process still uses conventional or lecture methods where the list of standard normal tables is Z_{table} (1.701) with a significance level of 0.05, the data obtained is $Z_{count} < Z_{table}$ or 0.909 < 1.701 then H_0 is accepted and H_1 is rejected. From this calculation, it can be concluded that the ratio of student learning outcomes in the control class that meets the minimum criteria is less than 75%. The classical completeness test for student learning outcomes is presented in Figure 1.



Gambar 1 Graph of the Classical Completeness Test of Student Learning Outcomes

DISCUSSION

Based on the observation activities by the observer, the calculation results with the average value of the observer implementing the PMRI approach show that the category of implementation of the learning process with the PMRI approach has fulfilled the classification with a very good category, namely at the second meeting the average observer one and two is 177.5 with percentage of 88.75%. Furthermore, at the third meeting, the average observer one and two was 183.5 with a percentage value of 91.75%, so each meeting was categorized as very good. This is in line with Oftiana & Saefudin, (2017) shows that the results of the learning process using the PMRI approach affect the ability to find solutions to students' math problems. This study proves that implementing the PMRI approach in the learning process positively impacts students' mathematical problem solving.

In this case students are encouraged to actively study independently to find their own knowledge related to the concept of the material being studied, the teacher only acts as a facilitator for students in encouraging them to gain new experiences every time they carry out activities to obtain information on the knowledge that is being explored. Consistent with the opinion of Hamidah *et al*., (2018) and Probowening *et al*., (2014) In the learning process besides being a teacher as a facilitator however, teachers are required to be active and innovative in applying learning approaches

so that it attracts students to participate in learning activities.

From the results of the classical completeness test using the PMRI approach, it can improve student learning outcomes in Mathematics. The completeness of the pretest students' classical learning outcomes with the application of the PMRI approach, namely the experimental class was incomplete because less than 75% of students achieved the KKM score (65) with an average student of 42.76. The lowest score in the classical learning outcomes of the pretest 30 class and the highest score in the classical learning outcomes of the pretest 60 class out of a total of 29 students, none of the students met the learning completeness criteria with a percentage of 0%. However, after receiving the treatment (posttest) where the PMRI approach was applied to the learning process in the experimental class, there was an increase in students' classical mastery because more than 75% of students achieved a KKM score of 65 with an average of 82.93. The lowest score is in the classical learning outcomes of the posttest 65 class and the highest score is in the posttest class 95 classical learning outcomes of 29 students who meet the learning completeness criteria with a percentage of 83%.

The results of classical mastery on student learning outcomes with the PMRI approach are also reinforced by the results of the calculation of the Z test, based on table 3 shows that the list of standard normal tables obtains Z_{table} results of 1.699 with a significance level used of 0.05, it is known that $Z_{count} > Z_{table}$ or $3.246 > 1.699$ then H_0 is rejected, which means that the ratio of learning outcomes for the experimental class meets the minimum completeness criteria (KKM) of 65 and achieves classical completeness of more than 75%. This shows the process of learning mathematics in fractional material through the PMRI approach can improve student learning outcomes in grade IV elementary school. In tune with Marta, (2018) and Febriyanti *et al*., (2019) the results of the analysis of the application of the PMRI approach show that the implementation of the PMRI approach in the learning process is able to improve mathematics learning outcomes.

CONCLUSION

According to the results and discussion of the implementation of the PMRI approach in the learning process, it can be concluded that the process of implementing the PMRI approach in mathematics learning has a positive impact on improving student learning outcomes, with the results being in the very good category, namely at the second meeting with an increase in the percentage score of 88.75 in the third meeting with a percentage value of 91.75. In addition, the results of classical completeness show an increase in mastery of more than 75% of students achieving a KKM score of 65 with an average score of 82.93 out of a total of 29 students fulfilling learning completeness with a completeness percentage of 100%. The classical mastery of the results of the Z test calculation shows $Z_{count} > Z_{table}$ or $3.246 > 1.699$ meaning that the proportion of student learning outcomes in the class taught by applying the PMRI approach meets the minimum completeness criteria (KKM) 65 reaching more than 75%. Thus, applying the PMRI approach to learning mathematics for fourth grade students at SDN Mangunharjo with fraction material has a positive impact on optimizing student learning outcomes.

Declaration by Authors

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