THE EFFECT OF THE INDONESIAN REALIST MATHEMATICS EDUCATION APPROACH ON LEARNING OUTCOMES OF DATA PRESENTATION IN GRADE V ELEMENTARY SCHOOL

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Abstract

This research aims to see how huge the influence of the Pendidikan Matematika Realisitk Indonesia (PMRI) approach is on learning outcomes by students in class V Cluster I, Koto Baru District. The method used in the research was a quasi-experimental design in the form of a nonequivalent control group design. The research population was all class V Cluster I students Koto Baru District. Sampling was carried out by purposive sampling, so class V A was obtained as the class for experimental and class V B as the class for control. Based on the research results, by testing the hypothesis using the t-test at the 0,05 level of significance, it was found that t_{count} = 5,202 and t_{table} = 2.014, which means H_1 is accepted because t_{count} > t_{table}. So we concluded that there is a significant effect of using the indonesian realist mathematics education approach on outcomes of learning by students in data presentation in class V Cluster I Koto Baru District.

Keywords: the indonesian realist mathematics education; Math; Data Presentation

Abstrak

Rendahnya kemampun peserta didik dalam pemahaman konsep matematika hingga menyebabkan rendahnya hasil belajar. Berdasarkan kajian literatur, pendekatan pembelajaran seperti PMRI memiliki kelebihan-kelebihan yang dapat dipakai dalam melakukan pengatasan akan permasalahan tersebut. Hal ini menyebabkan peneliti melaksanakan penelitian yang memiliki tujuan untuk melihat efek pendekatan berjenis Pendidikan Matematika Realisitk Indonesia (PMRI) akan hasil belajar dari peserta didik dalam materi penyajian data di kelas V Gugus I Kecamatan Koto Baru. Metode yang dipakai pada penelitian ini yakni *quasi eksperimental design* melalui bentuk *nonequivalent control group design*. Populasi dari penelitian ini yakni semua peserta didik dari kelas V Gugus I Kecamatan Koto Baru. Proses untuk mengambil sampel dilaksanakan melalui teknik *purposive sampling*. Sehingga diraih hasil dimana kelas V A menjadi kelas untuk eksperimen dan kelas V B menjadi kelas untuk kontrol. Berdasarkan hasil penelitian yang dilaksanakan melalui proses uji hipotesis untuk taraf signifikan 0,05 diperoleh t_{hitung} = 5,202 sedangkan t_{tabel} adalah 2,014 yang berarti H_1 diterima, karena t_{hitung} > t_{tabel}, jadi bisa diambil kesimpulan dimana terdapat pengaruh yang signifikan dari penggunaan model belajar Pendidikan Matematika Realisitk Indonesia (PMRI) akan hasil belajar dari peserta didik pada proses belajar tematik terpadu untuk kelas V Gugus I Kecamatan Koto Baru.

Kata Kunci: Pendidikan Matematika Realisitk Indonesia (PMRI); Matematika; Penyajian Data

Introduction

Math is one of the most important fields of study in elementary school that children must master. According to what is stated, we will face mathematics at every level of education, from elementary school to college. (Zainil et al., 2018) Mathematics is one of the

disciplines taught in educational institutions to students from elementary to advanced levels. Therefore, Mathematics is in every human existence, and everything humans do sometimes involves mathematics. According to (Ulandari et al., 2019), mathematics is a significant subject in the description of formal education, and mathematics is closely related to human life because mathematics is present in almost every aspect of our lives.

According to (Arrafi & Masniladevi, 2020), one of the goals of mathematics at the primary school level is to prepare children to become independent learners and can make discoveries of mathematical concepts that can be used in solving problems that occur in everyday life. Students participate in efforts to discover the concept of solving problems in mathematics. This is in line with Wahid's opinion (Azizah et al., 2018), which states that when students learn mathematics, they must be able to apply what they get in teaching in the context of solving problems in everyday life. Therefore, when teaching mathematics, it is not just providing supplies in the form of memory of formulas or concepts but also understanding of original mathematical concepts, supporting the improvement of learning outcomes through the application of approaches to the learning process (Faot & Amin, 2020).

The approach to the learning process is a benchmark, where the approach becomes the point of view of the learning process (Hasanah & Ariani, 2021). In the 2013 curriculum, several approaches can be used in learning mathematics. The PMRI approach is one of the approaches that can be used in learning mathematics in the 2013 curriculum. According to (Fitra, 2018), PMRI is a learning approach that is suitable for use in the process of learning mathematics in Indonesia in the current era, where the learning process already has a reference to the learning process of constructivism, where the knowledge that students achieve is the result of what they think, not as a result of the same knowledge given by the majority of educators in Indonesia so far.

PMRI has the characteristics of creating meaningful learning by providing extensive opportunities for natural students to carry out investigations and understand a concept through a problem in real conditions and can be imagined by students (Yandiana & Ariani, 2020). Suwarsono (in Ningsih, 2014) also explained the advantages of the Indonesian Realistic Mathematics (PMRI) learning process as follows: (1) PMRI presents a clear and operational definition to students about the connection of mathematics to our daily lives. (2) PMRI presents a clear and operational definition to students where mathematics is a component studied, compiled, and developed by students. (3) PMRI presents a definition where the effort in solving a problem should not be one and should not be similar from one person to another. (4) PMRI presents that the learning process is the main thing in carrying out the process of learning mathematics. People must carry out independently the stages and make efforts on their discover concepts, and topics from other mathematics with the help of combining the advantages of various approaches from other learning processes that are also assumed to be "superior," and (6) PMRI is complete (comprehensive), detailed and operational.

In addition, research written by (Safitri & Arlis, 2020) also proves that the Indonesian Realistic Mathematics Approach affects the learning outcomes of fourth-grade elementary school students in Gugus I Kenagarian Tanjung Sani Maninjau. Research conducted by Hasanah & Ariani, Y (2021) on "the effect of using a realistic mathematics education type approach on the learning outcomes of the nets of cubes and beams in class V cluster I North Pariaman" also produced a significant effect on the results of learning. Finally, research conducted by Elhusna (2020) which has the aim of knowing the effect of the learning outcomes of students for the learning process of mathematics in class V elementary schools in

the 2019/2020 academic year which, shows that there is an influence through the approach of Indonesian realistic mathematics education through the data analysis process of t-test results through a significant level of 5% (0.05) which reaches tcount> ttabel where 5.5574> 1.875131.

Similar research has never been carried out in the research subject area. The sampling technique used is also different where; this research uses purposive sampling technique while previous studies use cluster sampling technique, and the steps used here are steps from (Arrafi & Masniladevi, 2020) namely: (1) Understand contextual problems/questions 2) Provide contextual explanations, (3) Perform contextual problem solving, (4) Compare and discuss answers, and (5) Draw conclusions. The development of PMRI characteristics is combined with LKPD and media to help smooth the learning process and draw conclusions.

Based on observations and interviews conducted by researchers, it was found that the learning process generally did not apply a varied learning approach. The unavailability of the process of connecting teaching materials through the lives of students, and the lack of active involvement of students during the learning process, both in expressing opinions, asking questions, and constructing their knowledge, caused the learning outcomes of students participants in the current Mathematics learning process to be lacking.

Based on this description, the researcher has an interest in carrying out research that has the aim of knowing whether there is an influence of the Indonesian Realistic Mathematics Education (PMRI) type approach on learning outcomes through the process of presenting class V SD data. It is hoped that the research conducted can also provide benefits in adding knowledge and insight in advancing education in Indonesia, as well as helping to support the improvement of the learning outcomes of students in the process of learning mathematics, especially in presenting data as well as input material that can make the development of creativity and innovation from teachers.

Research Methods

The type of research conducted by researchers in quantitative research through experimental methods. The experimental research design used in this study is quasi-experimental in the form of a nonequivalent control group design. According to Zuardi, Yunisrul & Arwin (2019), a Nonequivalent control group design is a design for experiments that presents a pretest before giving action and a posttest after taking action. The research uses the Nonequivalent control group design (Sugiyono, 2020).

Table 1. Nonequivalent control group design

Classes	Pretest	Treatment	Posttest
Experiment	O_1	X	O_2
Control	O_3	-	O_4

This study took the population, namely students from grade V SDN Gugus I Koto Baru District. Sampling was carried out through the use of purposive sampling techniques. According to Arikunto (2019), purposive sampling is done not randomly but based on specific objectives. So based on this opinion, after several considerations, SDN 07 Koto Baru was chosen as the sample school, with class VA used as a class for experiments through the number of students with 24 people and class VB became a class for control through the number 23 of students.

Attention to the effect of the Realistic Mathematics Education type approach in achieving learning outcomes from students during the learning process of mathematics on data presentation material is done through a technique to collect data, namely the pretest and then the posttest through the use of test instruments in the form of objective questions or multiple choice. The test instrument was first tested on a class outside the sample to determine the feasibility of the questions obtained from analyzing the level of validation, reliability, differentiation, and difficulty index. After the test instrument was tested and analyzed, it was obtained that the questions to be used were 20 questions for the pretest and several posttest questions.

The pretest was conducted before the learning process of presenting data in the experimental group and the control class. The posttest was carried out after the learning process, in which the control class used a scientific learning process, and in the experimental class, an action was carried out through the application of the Indonesian Realistic Mathematics Education type approach. The pretest and posttest results achieved from students will be analyzed through the prerequisite test of the previous analysis, namely normality testing using the Liliefors test and homogeneity using the fisher test process. If prerequisite analysis testing can be achieved, hypothesis testing using the t-test can be carried out (Lestari & Yudhanegara, 2017).

Results and Discussion

The study was conducted at SDN 07 Koto Baru on "The Effect of Indonesian Realistic Mathematics Education type approach on Learning Outcomes of Students on Data Presentation Material Class V Gugus I Koto Baru District." The research began on June 6 to June 9, 2022. The population was all fifth-grade students of SDN Gugus I Koto Baru District. This study collected data from two sample groups, experimental and control groups. The experimental group was the VA class of SDN 07 Koto Baru with 24 students, and the control group was the VB class of SDN 07 Koto Baru with 23 students.

Researchers tested the pretest and posttest questions on the instruments used in the study before starting data collection. At SDN 01 Koto Baru, 24 grade VI students participated in the trial. In this study, the criteria for good items are determined based on the analysis of the item difficulty index, item reliability, validity, and differentiating power. Judging by the test results on trial, of the 20 items given after being analyzed using the analysis of item difficulty index, item reliability, validity, and distinguishing power, there were no items that were invalid because they were following the criteria for good items. Therefore, all 20 items tested previously can be used by researchers as research instruments.

After the pilot test was completed and the findings were known, the process continued by giving experimental and control group students a pretest. The purpose is to ensure students' initial knowledge before learning is carried out in both courses. Furthermore, in the learning process for the experimental group, learning with the Indonesian Realistic Mathematics Education type approach was used, but in the control group, the learning process was carried out through scientific learning. After the learning process for the experimental and control groups, the posttest was conducted for both groups. This was intended to determine students' final ability after the learning process with different approaches.

Pretest scores of learning outcomes The presentation of data on the groups for experimental and control can be observed in Table 2.

Table 2. Recapitulation of pretest results of data presentation in groups for experimental and control groups

Variable	Pretest	
	Experiment Group	Control Gruop
N	24	23
Nilai Tertinggi	80	80
Nilai Terendah	20	15
Mean/Rata-Rata	45,63	44,57
Standar Deviasi	18,02	18,58
Varians	324,59	345,26

Table 2 shows that the highest score was 80, and the smallest score was 20, with a mean of 45.63, a standard deviation of 18.02, and a variance of 324.59. Meanwhile, the control group had a maximum score of 80 and a minimum score of 15, an average of 44.57 standard deviations of 18.58 and a variance of 345.26. When viewed from the pretest achievement, it can be seen that the achievement of learning mathematics for data presentation material in the group for the experiment is lower when compared to the control class.

Furthermore, the following table summarizes the achievement posttest scores in each sample class:

Table 3. Recapitulation of posttest results of experimental group and control group data presentation

Variable	Posttest	
	Grup Eksperimen	Grup Kontrol
N	24	23
Highest Score	100	90
Lowest Score	55	20
Mean	83,54	60,65
Standard Deviation	13,63	16,26
Variance	185,82	264,33

Based on table 3, the group experiment got the highest score of 100, the lowest score of 55, a mean of 83.54, standard deviations of 13.63, and variance of 185.82. In the control group, the highest score of 90, the lowest score of 20, the mean of 60.65, the standard deviation of 16.26, and the variance of 264.33. Referring acquisition posttest, the experiment group is superior to the control group.

Based on the data analysis above, there is a gap in learning achievement between the two sample classes in achieving learning outcomes in mathematics material on data presentation material. The pretest average of the experimental group was 45.63, while the control group average was 44.57. The average posttest score of the experimental group was 83.54, but the average posttest score of the control group was 60.65. When comparing the pretest and posttest scores between the groups for the experimental-control group can be seen in table 4.

Table 4. Comparison of pretest and posttest group means for experimental and control groups

No	Group	Average	
		Pretest	Posttest
1	Experiment	45,63	83,54
2	control	44,57	60,65

The mean pretest score for the experimental group was 45.63, and the mean pretest score for the control group was 44.57. These two numbers show the difference between the experimental and control groups, which is 1.06. There is a difference where the learning outcomes in the group for experiments with the Indonesian Realistic Mathematics Education type of approach are far superior, with a magnitude of 37.91 compared to the group for control after the implementation of the learning process through an increase of only 16.08.

After finding the pretest and posttest results, data analysis was conducted. Data analysis in this study intends to find out the effect of learning with the Indonesian Realistic Mathematics Education type of approach on learning outcomes for data presentation in class V SDN 07 Koto Baru, Koto Baru District.

Before carrying out hypothesis testing, researchers perform prerequisite testing using normality and homogeneity testing. The normality analysis of the sample groups from both the pretest and posttest data using the Liliefors test proves that the data used is normally distributed with the provisions of L0 < Ltabel. . Furthermore, the results of the homogeneity test using the fisher test also prove that the sample has a homogeneous variance with the provisions of fitting < ftabel

Then, after testing the prerequisites, the t-test formula proposed by Sugiyono (2020) is used to test the hypothesis. Through the t distribution list where the significance level is 0.05 and dk = n1 + n2 - 2 = 24 + 23 - 2 = 45, ttabel = 2.014 is obtained while thitung = 5.202. Therefore, it can be concluded that there is an effect of the learning process with the Realistic Mathematics Education type approach. Based on the acquisition of data analysis, thitung > ttabel, which is 5.202 > 2.014, means the rejection of H0 and acceptance of H1. Therefore, it can be concluded that the learning process with the Indonesian Realistic Mathematics Education type approach affects learning outcomes for data presentation in class V elementary school.

The research that intends to see the effect of the Indonesian Realistic Mathematics Education type approach on students' learning outcomes for data presentation material in class V elementary school took place in two meetings with the same material in each sample class. The learning process is carried out by giving treatment using an Indonesian Realistic Mathematics Education type approach in the group for experiments and in the group for control only taught with scientific learning. The treatment also provides the acquisition of hypothesis testing using the t test which proves that there is an effect of the Indonesian Realistic Mathematics Education type approach on the learning outcomes of students for class V data presentation material.

The learning carried out in the experimental group using the Indonesian Realistic Mathematics Education various approach is based on the steps proposed by (Arrafi & Masniladevi, 2020), namely: (1) Understand contextual problems/questions, 2) Provide contextual explanations, (3) Perform contextual problem solving, (4) Compare and discuss the answers, and (5) Make conclusions.

Based on the hypothesis testing findings, the Indonesian Realistic Mathematics Education learning method benefits student learning outcomes. As can be seen, there are different learning outcomes between students in the experimental group who used the Indonesian Realistic Mathematics Education learning approach and students who used scientific learning; the average in the experimental group scored 83.54, while the control group scored 60.65. The Indonesian Realistic Mathematics Education type approach can increase students' learning outcomes through meaningful learning that connects realistic or real situations with the learning being carried out. As explained (Yandiana & Ariani, 2020), the Indonesian Realistic Mathematics Education type approach provides a broad and meaningful opportunity where students can understand a mathematical concept in real life and can be imagined, students. A statement (Hazami, 2013) explains that Realistic Mathematics Education has a starting point from something real for students so that they can make their discoveries and use mathematics in work through problems alone and in groups. Another claim is that the Indonesian Realistic Mathematics Education type approach can improve student learning outcomes (Roslinawati et al., 2017). In addition, through this Indonesian Realistic Mathematics Education approach, students construct their understanding by finding the mathematical concepts they are learning. As stated by (Ningsih, 2014), students can actively construct their mathematical knowledge and know when the mathematical concepts are applied in solving a problem.

In the learning process in the control group, it can be observed that some students still feel bored and do not concentrate on learning. The learning process that does not feel real for students and only relies on exposure from the teacher makes students less active both in the learning process and in constructing their understanding of concepts. This results in the learning outcomes of students in the control group being less than those in the experimental group.

Conclusion

Based on the research findings, it can be said that the Indonesian Realistic Mathematics Education various approach affects the learning outcomes of grade V SDN data presentation as indicated by the t-test results, which show that the learning outcomes of grade V SDN students for data presentation material for both classes are significantly different.

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