



Online Learning Based on Realistic Mathematic Education (RME) Assisted Animation Media in Improving Student Learning Outcomes

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ABSTRAK

Masih banyak guru yang kesulitan dalam menentukan metode belajar dan media pembelajaran yang sesuai untuk pelajaran matematika. Hal ini berdampak pada hasil belajar siswa yang rendah. Penelitian ini bertujuan untuk menganalisis pengaruh pendekatan Realistic Mathematic Education (RME) berbantuan media animasi terhadap hasil belajar matematika siswa. Penelitian ini merupakan penelitian kuantitatif dengan jenis penelitian quasi eksperimental design dengan desain penelitian Non Equivalent Control Group Design. Penelitian ini melibatkan 30 siswa sebagai sampel penelitian dengan teknik pengambilan sampel acak sederhana (Simple Random Sampling). Penelitian ini menggunakan teknik pengumpulan data yaitu observasi dan tes tertulis dengan memberikan lima butir soal uraian dengan bobot yang berbeda tiap soalnya. Data yang diperoleh dianalisis dengan menggunakan aplikasi SPSS v.22 dengan mencari hasil dari uji normalitas, uji homogenitas, uji N-Gain dan terakhir uji-t (Independent Sample Test) untuk menguji hipotesis. Hasil penelitian menunjukkan bahwa terdapat perbedaan antara nilai rata-rata siswa dengan menerapkan pendekatan Realistic Mathematic Education (RME) berbantuan media animasi memperoleh nilai rata-rata 74.60 kategori sedang. Berdasarkan hasil analisis data yaitu terdapat pengaruh yang signifikan terhadap hasil belajar matematika yang dapat dibuktikan dari nilai signifikansi pada output Independent Sample Test yaitu $0.000 < 0.05$ yang berarti bahwa H_0 ditolak dan H_a diterima. Dapat disimpulkan bahwa pendekatan Realistic Mathematic Education (RME) berbantuan media animasi dapat meningkatkan hasil belajar matematika.

ABSTRACT

There are still many teachers who have difficulty determining appropriate learning methods and learning media for mathematics lessons. This has an impact on student learning outcomes are low. This study aims to analyze the effect of the Realistic Mathematical Education (RME) approach assisted by animation media on students' mathematics learning outcomes. This research is a quantitative research with a quasi-experimental research design with a non-equivalent control group design research design. This study involved 30 students as the research sample with a simple random sampling technique (Simple Random Sampling). This study uses data collection techniques, namely observation and written tests by giving five essay questions with different weights for each question. The data obtained were analyzed using the SPSS v.22 application by looking for the results of the normality test, homogeneity test, N-Gain test and finally the t-test (Independent Sample Test) to test the hypothesis. The results showed that there was a difference between the students' average scores by applying the Realistic Mathematical Education (RME) approach with the aid of animation media, obtaining an average score of 74.60 in the medium category. Based on the results of data analysis, there is a significant effect on mathematics learning outcomes which can be proven from the significance value at the output of the Independent Sample Test, namely $0.000 < 0.05$, which means that H_0 is rejected and H_a is accepted. It can be concluded that the Realistic Mathematical Education (RME) approach assisted by animation media can improve mathematics learning outcomes.

1. INTRODUCTION

Mathematics is the basis for the development of Science and Technology (Schoenfeld, 2016; Yamashita et al., 2019). Mathematics is a science that studies abstract structures and patterns of relationships that exist in them (Abramovitz et al., 2012). Studying mathematics is important because it can improve logical and clear thinking skills and solve everyday problems (Rajagukguk & Simanjuntak, 2015; Setiawan & Ari Oka, 2020). So that by studying mathematics, someone will have the ability to solve problems. This shows the importance of mathematics education in the life of every human being. Mathematics learning can be carried out well if the teacher uses an appropriate learning approach. Teachers must have good learning design and management skills. One of them is choosing and applying a good learning approach or learning media (S. Lin et al., 2020; Mailizar et al., 2020). Learning can be said to be successful if the learning objectives are adequately achieved. A good learning approach will make learning meaningful (Jailani, 2017; Setyowati & Mawardi, 2018). This causes teachers to be challenged in increasing the quality of mathematics learning at every level, especially at the elementary school level.

The problem that occurs today is that many teachers still have difficulty determining the appropriate learning model for mathematics lessons (Rajagukguk & Simanjuntak, 2015; Setiawan & Ari Oka, 2020). This impacts students feeling bored in learning mathematics (Mailizar et al., 2020; Mullis et al., 2012). In addition, teachers also have difficulty developing appropriate learning media (Baya'a et al., 2019; Dinayusadewi et al., 2020). This problem was also found in one elementary school. Based on observations made by SD Inpres Bangkala I, Manggala District, Makassar City, it was found that teachers had difficulty in determining the suitable learning model for mathematics lessons. In addition, the lack of learning media that can facilitate students in learning makes it difficult for students to understand mathematics subject matter. This has an impact on low mathematics learning outcomes. Based on the results of interviews conducted with one of the teachers, it was found that one of the subject matter that is difficult for students to master is fractions found at the fourth grade level of mathematics at KD 3.1 (Explaining equivalent fractions with pictures and concrete models). This material is essential considering that fractions are a theory that is usually needed in everyday life. In mathematics at KD 3.1, only 41% or 12 students passed, and 59% or 18 students did not. This shows that there are still students who have learning difficulties in mathematics, especially in fractions.

The solution to overcome these problems is that teachers must apply innovative learning to improve mathematics learning outcomes. Mathematics learning outcomes are indicators of effectiveness in learning mathematics (Cimen, 2014; Hassan et al., 2016). High mathematics learning outcomes indicate that the mathematics learning process is carried out effectively, and vice versa with low mathematics learning outcomes, the mathematics learning process is carried out ineffectively (Faidah et al., 2019; Hwang et al., 2020). Mathematics learning outcomes can be caused by several things: the curriculum is too dense, the learning media is sometimes less effective, and the teacher chooses the strategies and learning methods are still not right. The ability of a teacher who does not provide motivation for students or is caused by a conventional learning approach makes students less involved in the learning process in the classroom (Fatah et al., 2016; Waziri et al., 2010). One way to improve a pleasant learning atmosphere is to use an innovative learning approach.

The learning approach is an essential aspect of the learning process because the success of learning in the classroom depends on the learning approach applied by the teacher (Hafidzah et al., 2019; Riyanto & Gunarhadi, 2017). One of the best online-based approaches and methods applied by teachers is the animation-assisted Realistic Mathematical Education (RME) approach. This approach is very well applied because it can solve math problems and motivate students by relating the concept to everyday life (Japa et al., 2017; Sulastri & Kusmanto, 2016). The Realistic Mathematical Education (RME) approach is an approach that solves abstract mathematics learning problems (Sitorus & Masrayati, 2016; Sumirattana et al., 2017). The Realistic Mathematical Education (RME) approach has several advantages: making mathematics learning more meaningful, less formal, not too relevant, and more interesting (Arsaythamby & Zubainur, 2014; Bosica et al., 2021). In addition, this approach considers the level of student ability, emphasizes learning mathematics in learning by doing, facilitates solving mathematical problems, and uses context as a starting point for learning mathematics (Dooren et al., 2019; Zandieh & Rasmussen, 2010). This will make students not feel bored so that the learning delivered will be more memorable, and the concepts implanted by the teacher will be remembered longer by students.

In addition, teachers who provide material reinforcement to students will be more channeled if the teacher applies a learning approach and utilizes learning media. One of the learning media that can be used is animation. *Animation* is an image made using a specific technique so that the image seems to move when seen by the eye (L. Lin & Li, 2018; E Saripudin et al., 2018). Animation is a moving image in the form of a set of objects arranged in an orderly manner following a predetermined movement at every increase

in time that occurs (Andhika et al., 2013; Rahayuningsih, 2020). The image or object referred to in the above definition can be images of humans, animals, or writing. The advantage of animation is that animation can make students convey and perfect a message to be conveyed to listeners (Endang Saripudin et al., 2018; Satyawan, 2018). So that by using this animation media can increase the enthusiasm of students' learning so that learning objectives can be achieved. Realistic Mathematical Education (RME) assisted by animation reinforces students related to mathematics learning so that the learning outcomes obtained are expected to have an effect and experience better changes, especially in fractional material.

The findings of previous research stated that Realistic Mathematical Education (RME) is an approach to learning mathematics that can facilitate students learning mathematics (Faidah et al., 2019; Sulastri & Kusmanto, 2016). Other research findings also state that animation can attract students' attention, making it easier to learn (Hanif, 2020; Kühn, 2021; Zhang et al., 2020). It can be concluded that animation-assisted Realistic Mathematical Education can help students learn, especially in mathematics. There is no study on the approach to Realistic Mathematical Education assisted by animation. The purpose of this study is to analyze the approach of Realistic Mathematical Education assisted by animation. It is hoped that the Realistic Mathematical Education approach with the aid of animation can help students learn mathematics.

2. METHOD

This study uses a quantitative approach using a pre-experimental design, and the type of research is One Group Pretest-Post Test Design. This design uses one class group designated as the subject in the study, namely class IV A. This research was carried out at UPT SPF SD Inpres Bangkala I. The population in this study were all fourth-grade students in Cluster IV, Manggala District. The sample taken in this study used the Simple Random Sampling technique. The sample of this research is all fourth-grade students with a total of 30 students. Data were collected through a mathematics learning outcome test in the form of an essay consisting of five questions with different weights for each question according to the level of difficulty of the questions. Before being used, the question is first validated, both in terms of the language construct and the content of the question. The question was validated by two people who are experts in mathematics and elementary education. Furthermore, the data obtained were analyzed using a quantitative descriptive analysis approach and inferential statistical analysis. To test the hypothesis, a prerequisite test is first performed. The prerequisite tests for data analysis include normality and homogeneity tests, while hypothesis testing uses paired sample t-test.

3. RESULT AND DISCUSSION

Result

From the research results, the researchers applied the Realistic Mathematical Education (RME) approach with the aid of animation media to the fourth-grade students of UPT SPF SD Inpres Bangkala I on the material of equivalent fractions. Based on the results of data analysis, the data obtained that the average value (mean) of the students' pretest was 69.67 in the less category, while the post test was 74.60 in the medium category. This indicates that there is an increase in students' mathematics learning outcomes. To support these data, the N-Gain test was carried out. The N-Gain Score test aims to determine the effectiveness of using a method in research or by calculating the difference between the pretest and posttest scores. The calculation results on the SPSS v.22 application show that the experimental class is included in the quite effective category, while the control class is included in the ineffective category. Based on the calculation results, the result is 0.45. Then the value is in the medium category, indicating that it can effectively give this approach.

The normality test aims to see whether the data distribution of the research variables is normal or not, both from the experimental class and the control class. The normality test in this study using SPSS v.22 using the Kolmogorov-Smirnov Test of Normality shows that the data is usually distributed. Based on the results of data analysis, it was found that both P-values were > 0.05 , so they were usually distributed. From the results of the calculation of the homogeneity test, if the significance is more than the value of which is 0.05, then the data is said to be homogeneous. Based on the Lavene Statistics homogeneity test, the analysis of mathematics learning outcomes was obtained that the significance of the data was $0.494 > 0.05$, so the data was declared homogeneous. After the prerequisite test is met, then the research hypothesis is tested using the paired sample t-test. By the output value of the paired sample test, the significance value is $0.000 < 0.05$ and the value of $t_{count} > t_{table}$ ($7.170 > 2.05$), it can be concluded that H_0 is rejected and H_1 is accepted, that is, animation media assist an influence on the Realistic Mathematical Education (RME) learning approach. on the learning outcomes of fourth graders of UPT SPF SD Inpres Bangkala I, Manggala District, Makassar City. Based on the results of data analysis, there is a

significant effect on mathematics learning outcomes which can be proven from the significance value on the Independent Sample Test output, namely $0.000 < 0.05$, which means that H_0 is rejected and H_a is accepted or $t_{count} > t_{table}$ ($5,685 > 2.00172$) which means that there is an influence which is significant from the application of Realistic Mathematical Education (RME) assisted by animation media on the learning outcomes of fourth-grade students of UPT SPF SD Inpres Bangkala I, Manggala District, Makassar City.

Discussion

The effect of learning outcomes in class IV has an extensive comparison. This is evidenced by the average score of student learning outcomes before and after being given treatment. Thus, applying the Realistic Mathematical Education (RME) learning approach assisted by animation media has a significant influence on mathematics learning, especially in class IV on equivalent fraction material. Several factors cause this. First, the Realistic Mathematical Education (RME) learning approach can make learning easier for students. An appropriate learning approach will make it easier for students to understand the learning material (Cimen, 2014; Hwang et al., 2020). The choice of a learning approach is essential for teachers to do. The learning approach will create a learning atmosphere for students, so teachers are obliged to choose the right learning approach (Riyanto & Gunarhadi, 2017; Waziri et al., 2010). The Realistic Mathematical Education learning approach is appropriate for elementary school students (Jeheman et al., 2019; Wahyuni, 2019). The Realistic Mathematical Education learning approach provides an opportunity to rediscover mathematical ideas and concepts with adult guidance (Faidah et al., 2019; Hidayat et al., 2020). In addition, this approach also requires students to solve contextual problems in their way individually. The most important thing is that students can know when and what constructs they apply mathematical concepts in solving a problem. Meanwhile, the teacher is no longer a transmitter of ready-made information but a companion for students to actively construct (Cimen, 2014; Hwang et al., 2020).

Second, using learning media to use the Realistic Mathematical Education (RME) learning approach can increase students' learning motivation. Learning media is one of the tools that can distribute learning materials to students (Gunawan et al., 2017; Prasetyo et al., 2020). Learning media has many benefits and is also used effectively. One of the benefits of learning media is helping teachers teach (Bustanil S et al., 2019; Gunawan et al., 2017). In addition, learning media can also increase students' enthusiasm for learning. Animation is one learning medium that can help students learn (Lukman et al., 2019; Noviyanto et al., 2015). This animation is one of the interesting learning media that can increase the enthusiasm of students in learning. Animated media is a type of audio-visual media because there is the movement of images and sounds. This makes it easier for students to learn according to students' learning styles, namely audio and visual (Muslina et al., 2018; Yuliani, 2017). Learning animation media can be used as teaching tools that are ready to be used at any time to deliver subject matter. The findings of previous research stated that Realistic Mathematical Education (RME) could facilitate students in solving mathematical problems (Faidah et al., 2019; Sulastri & Kusmanto, 2016). Other research findings also state that animated media can increase students' enthusiasm and motivation in learning (Kartika et al., 2019; Margareta & Wahyuno, 2014). So that the Realistic Mathematical Education (RME) approach, with the help of animated learning media, will make it easier for students to learn mathematics, this research implies that the Realistic Mathematical Education (RME) approach with the help of animated learning media can be used by teachers in teaching so that it can help students who have difficulty understanding mathematics learning materials.

4. CONCLUSION

The realistic Mathematical Education (RME) approach assisted by animation media affects improving student learning outcomes. The Realistic Mathematical Education (RME) approach assisted by animation media is effectively used to support learning in the classroom so that it has an impact on increasing students' understanding of mathematics lessons.

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