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Problem-Based Learning Models with Powerpoint Animation Media on Learning Outcomes and Cooperation Attitude

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Abstract

Based on the problem, the data shows that elementary school students have learning outcomes and cooperative attitudes. This research was written to describe the effect of the third-grade students' understanding of Merdeka Elementary School before and after using the Problem-Based Learning model with PowerPoint animation media on learning outcomes and cooperative attitudes toward fractional operations material. The research method used is quantitative research. This study uses a control group pre-test and post-test design. The data collection techniques used in this study were tests, questionnaires, observation, and documentation. Data analysis techniques were performed using statistical analysis consisting of normality tests, homogeneity tests, paired sample t-tests, independent sample t-tests, and ANOVA tests. The study showed better student learning outcomes after applying the problem-based learning model with PowerPoint animation media. The cooperative attitude of students after applying the problem-based learning model with PowerPoint animation media is better than before using it. Meanwhile, learning outcomes and cooperative attitudes after using the problem-based learning model with PowerPoint animation media were better than the cooperative learning model with fruit media. This study proves the Problem-Based Learning model with PowerPoint animation media can improve learning outcomes and students' cooperative attitudes.

INTRODUCTION

Indonesia is a developing country that can compete internationally, one of which is in the field of education. Education is a solution to develop a skill that exists in a person [1]. Education has a considerable influence on advancing a country. For that, we need to do a renewal in the educational process. In education, there is a critical element in its implementation, namely, the teacher. An educator must have teaching skills, such as building motivation, inviting students to actively participate in learning, applying innovative learning media, and creating a fun learning atmosphere [2].

The importance of education is that students must be able to understand various subjects, especially mathematics. Learning mathematics in grade three at the elementary school level has one of the materials: operations on fractions. Permendikbud No. 37 of 2018 concerning Basic Competence (KD) and Core Competency (KI) in the 2013 Curriculum, KD 3.5 Elementary

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School mathematics content states, "Explain and practice the concept of adding and subtracting fractions with the same denominator". Mathematics is a science that emphasizes concepts [3]. In delivering material on fractional operations, the teacher does it verbally using the teacher's book as a guide.

In the learning process, both students and teachers must face many problems. Less active students in learning because students are not involved in learning. This is due to the incompatibility of the learning model with the operational material
fraction number. The learning model often used is lecture, so the material presented is complex for students to understand [4]. The learning model is insufficient to explain the material verbally, so a structured learning model is needed.

In addition to learning models, an educator also needs media or learning aids to deliver material in the classroom learning process. However, at this time, many educators still do not use media, so the class is far from being creative and innovative. Even with this media, students can better understand the material presented. Educators are currently required to follow technological trends to create clever and practical learning to improve the quality of education [2]. For this reason, learning aids significantly affect student learning outcomes.

As a measure of success, student learning scores are used to observe students' ability to understand the material obtained during the learning process [5]. Based on the results of simple observations that researchers have made, it is difficult for students to solve problems related to fractional operations material. As many as 50% of student scores did not reach the KKM. Students can be successful in their learning process if they have obtained KKM 75 of at least 75% of all students in the class [6]. Students who cannot accept the given concept can have low learning outcomes [7]. For that, understanding the idea affects student learning outcomes.

In learning activities, various attitudes must be cultivated, one of which is the attitude of cooperation. The philosophy of collaboration is critical because it can facilitate students in group activities, give them a sense of responsibility, and help them accept the opinions of others [8]. However, the attitude of cooperation is still not well-conditioned. The rare learning activities designed in groups affect the low mood of student cooperation. The humble, cooperative attitude in school activities makes students more individualistic and less cohesive in group activities. One of the possible efforts that can be made to increase the results of the value and cooperation of students in learning mathematics related to fractional operations is to change the existing models and learning media. This effort is considered to improve student learning outcomes [1].

One of the learning models created with the basic concept of problem-solving is the Problem-Based Learning model. The problem-based learning model is currently widely used because it is considered capable of increasing critical thinking and finding solutions to problems faced by students individually or in groups [3]. Therefore, this learning model can hone cooperative attitudes, activeness, and critical thinking skills to improve student learning outcomes. In addition to learning models, learning media are also needed. Students who experience difficulties in the learning process need media as a tool to understand the material [9]. There are many solutions to making learning media interesting, creative, and innovative in this era. In learning mathematics, teachers can use computers to visualize material [10]. One of the learning aids that can be used is a multimedia-based method using Microsoft PowerPoint to create PowerPoint animations. PowerPoint animation is a multimedia-based media using an

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attractive and easy-to-make application program [11]. The application of PowerPoint animation media can be in the form of interactive quizzes done in groups to increase learning scores and attitudes of students' cooperation in learning.

Based on the explanation of these problems, this study aimed to describe the effect of third-grade students' understanding of Merdeka Elementary School before and after using the Problem-Based Learning model with PowerPoint animation as media on learning outcomes and cooperative attitudes on fractional operations material.

METHODS

This research uses a method that is quantitative research. This study uses a control group pre-test and post-test design. This method is used to find out the data before and after treatment. Treatment is given by applying the problem-based learning model with PowerPoint animation media. Students have distributed pre-test learning outcomes tests and pre-test cooperative attitude questionnaires before learning activities. After being given learning, students were distributed post-test learning outcomes tests and post-test questionnaires on cooperation attitudes at the end of education.

Table 1. Control Group Pre-test and Post-test Design [12]

Group	Pre-test	treatment	Post-test
Experiment	O_1	X	O_2
Control	O_3	-	O_4

The research was conducted at Merdeka Elementary School on March 13, 14, and 15, 2023. Merdeka Elementary School is one of the elementary schools in Colomadu District, Karanganyar Regency, with A accreditation. This research took the population of students at Merdeka Elementary School. SD Merdeka, from class I to class VI, there are 12 classes. The sampling technique used is cluster random sampling. The sample for this research was third-grade students consisting of 2 courses. Class IIIA comprised 25 students as the experimental class, and class IIIB consisted of 19 as the control class. The independent variable used in this study is the Problem-Based Learning model with PowerPoint animation media, while the dependent variable is learning outcomes and cooperative attitudes. Learning outcomes are a measuring tool to determine how much students understand the material taught. At the same time, the philosophy of cooperation is an activity carried out in groups to obtain the desired results.

The data collection techniques used in the study were (1) tests, in the form of multiple choice questions and descriptions to determine learning outcomes in fractional number operations, (2) questionnaires, used to determine students' cooperative attitudes, (3) observation, implementation of learning and (4) documentation, in the form of lesson plans, names of students and photos during research.

It is necessary to test the validity and reliability of instrument tests. A validity test and reliability test were carried out before the study. The validity test was carried out by distributing test and questionnaire instruments to 31 students. Provisions for the instrument's validity can be measured based on the criteria, which state that if r-count > r-table, the instrument can be declared valid. Based on the validity test of the learning outcomes test on multiple choice

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questions with a significance level of 5% with n = 31 and r-table = 0.355, a total of 10 questions with valid test results and five invalid items were obtained. Testing the learning outcomes validity on description questions with a significance level of $\propto$=5% with n = 31 and r-table = 0.355, 5 questions were obtained with valid test results. Meanwhile, the validity test of the collaboration questionnaire with a significance level of $\propto$=5% with n =31 and r-table = 0.355 received 16 items with valid test results, and nine items were invalid.

A reliability test is used to measure the consistency of the instrument. Reliability test provisions are declared reliable if r-count > r-table. The test results are reliable based on the reliability test of the learning outcomes test on multiple choice questions with a significance level of $\propto$=5% with n=31 and r-table = 0.355, r-count = 0.63e. The reliability test of the learning outcomes test on description questions has a significance level of 5% with n = 31, r-table = 0.355, and r-count = 0.620. The test results are reliable. Meanwhile, the reliability test of the cooperative attitude questionnaire at a significance level of $\propto$ = 5% with n =31 and r-table = 0.355 obtained r-count = 0.777, and the test results are reliable. Data analysis techniques were performed using statistical analysis, which consisted of normality tests, homogeneity tests, paired sample t-tests, independent sample t-tests, and ANOVA tests.

RESULTS AND DISCUSSION

According to the results of observations obtained by researchers after holding three meetings, it can be seen that students show activeness in learning activities. Before the first meeting, students were distributed pre-tests of learning outcomes tests and pre-tests of cooperative attitude questionnaires. At the first meeting, the students enthusiastically participated in class activities. This can be seen from how students respond through questions and answers and submit their opinions. At the third meeting, students carried out a post-test of learning outcomes and a post-test of cooperative attitudes to determine the influence after learning was carried out.

Figure 1. Students observe the problem

The problem-Based Learning Model has five syntaxes, namely: (1) student orientation related to problems, (2) organizing students for learning, (3) teaching students individually or in

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groups, (4) presenting work, and (5) analysis and evaluation [13]. All syntax can run coherently with pace on the lesson plan sheet that has been made. Learning activities begin by introducing students to existing problems, then directing students to find ways to solve problems, then helping guide students individually and in groups, after students present the results and finally evaluate the results of the problem-solving carried out. The Problem-Based Learning model has several advantages, including (1) student-centred learning, (2) the teacher acts as a facilitator, and (3) students' mindsets are directed to be critical in overcoming the problems they face [3].

Figure 2. Powerpoint Animation Learning Media

PowerPoint animation media makes students very active in participating in learning. In this media, besides explaining the material, several quizzes make students enthusiastic about answering them. PowerPoint animation media also has advantages, namely (1) its attractive appearance, (2) it can be used easily and practically, (3) it is more straightforward to understand, and (4) it has a choice of features [14].

Normality tests, homogeneity tests, Paired Sample T-tests, Independent Sample T-tests, and ANOVA tests were then carried out with the results obtained from the pre-test and post-test. The results of the normality test for the control and experimental classes are in Table 2.

Table 2. Normality Test Results

Variable	Sig.	Information
Control Class		
Pre-test Learning Outcomes	0.136	Normal
Post-test Learning Outcomes	0.199	Normal
Cooperation Attitude Pre-test	0.083	Normal
Post-test Attitude of Cooperation	0.397	Normal
Experiment Class		
Pre-test Learning Outcomes	0.066	Normal
Post-test Learning Outcomes	0.306	Normal
Cooperation Attitude Pre-test	0.237	Normal
Post-test Attitude of Cooperation	0.058	Normal

A data is called regular if the sig. > 0.05. it was found that the sig. Control class data and experimental class pre-test learning outcomes, post-test learning outcomes, pre-test cooperative attitudes, and post-test cooperative attitudes > 0.05. So, the results can be accepted that the data used is standard because of the sig. > 0.05.

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Table 3. Homogeneity Test Results

Variables	Sig.	Information
Learning Outcomes Pre-test Experiment	0.052	Homogeneous
Cooperative Attitude Post-test Experiment	0.996	Homogeneous
Learning Outcomes Post-test Control Experiments	0.325	Homogeneous
Cooperation Attitude Post-test Control -Experiment	0.163	Homogeneous

If the sig. > 0.05, then the data is homogeneous. Control and experimental class pre-test learning outcomes, post-test learning outcomes, pre-test cooperative attitudes, and post-test cooperative attitudes > 0.05. So, it can be concluded that the data used is homogeneous because the sig. > 0.05.

The Problem-Based Learning model with PowerPoint animation media on learning outcomes in fractional operations material can be tested using the Paired Sample T-Test. The results of the Paired Sample T-Test are in Table 4.

Table 4. Paired Sample T-Test

Learning Outcomes	Means	Difference	t-count	Sig	Information
Pre-test	57.00	21,6	-12,435	0.000	Ha Accepted
Post-test	78,60				

Based on the Paired Sample T-Test results, the t-count value was -12.435 > 2.059 with a sig. Equal to 0.000 < 0.05, then Ha is accepted, and Ho is rejected so that student learning outcomes after applying the Problem-Based Learning model with PowerPoint animation media on fractional operations material for class III SD Merdeka are better than before using. Judging from the results, the average value of student learning outcomes before and after the application of the Problem-Based Learning learning method with PowerPoint animation media has increased by 21.6, which before applying the Problem-Based Learning model with PowerPoint animation media had an average of 57.00 and after using the Problem-Based Learning model with PowerPoint animation increased to 78.60.

The Problem-Based Learning model with PowerPoint animation media on cooperative attitudes on fractional operations material can be tested using the Paired Sample T-Test. The results of the Paired Sample T-Test are in Table 5.

Table 5. Paired Sample T-Test

Cooperation Attitude	Means	Difference	t-count	Sig	Information
Pre-test	61.56	11.36	-14.697	0.000	Ha Accepted
Post-test	72.92				

Based on the Paired Sample T-test results, the t-count value is -14.697 > 2.059 with a sig. of 0.000 < 0.05. H_a is accepted, and Ho is rejected, so the cooperative attitude of students after applying the problem-based learning model with PowerPoint animation media on fractional operations material for class III SD Merdeka is better than before using it. Judging from the results, the average value of students' cooperative attitudes before and after applying the problem-based learning model with PowerPoint animation media increased by 11.36. Before using the Problem-Based Learning model with PowerPoint animation media, it had an average of

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61.56, and after applying the Problem-Based Learning model with PowerPoint animation, it increased to 72.92.

The ANOVA test can test the Problem-Based Learning model with PowerPoint animation media on learning outcomes and cooperative attitudes on fractional operations material. Before carrying out the Anova test, it is necessary to test the Independent Sample T-Test. The Independent Sample T-Test is in Table 6, and the Anova test is in Table 7.

Table 6. Independent Sample T-Test

Variable	Means	Difference	t-count	Sig.	Information
Learning outcomes					
Control	63.16	6.16	1.963	0.056	Ha Rejected
Experiment	57.00				
Cooperative Attitude					
Control	57.63	3.37	0.719	0.099	Ha Rejected
Experiment	61.00				

Based on the Independent Sample T-Test test results for the learning outcomes variable, the sig. of 0.056 <0.05, then Ha is rejected. Ho is accepted, so learning outcomes in class III fractional operations material before using the Problem-Based Learning model with PowerPoint animation media are not better than the cooperative learning model with fruit media. Meanwhile, the Independent Sample T-Test results for the cooperative attitude variable obtained a sig. When equal to 0.099 > 0.05, H_a is rejected, and H_0 is accepted. So, the attitude of cooperation in class III fraction operations material before using the problem-based learning model with PowerPoint animation is not better than the cooperative learning model with fruit media.

Table 7. ANOVA Test Results

Variable	F	Sig.	Information
Post-test	14.414	0.000	Ha Accepted

Anova test, the F value was 14.414 with a sig. Equal to 0.000 < 0.05, then Ha is accepted, and Ho is rejected so that the learning outcomes and attitudes of students' cooperation in class III fractional number operations material after using the Problem-Based Learning model with PowerPoint animation media is better than the Cooperative Learning learning model with fruit media fruit.

Using the problem-based learning model with PowerPoint animation makes learning more interesting, so students experience increased interest and new learning motivation, which increases their learning outcomes [11]. Using Problem-Based Learning with PowerPoint animation makes students interested in learning, positively impacting their learning outcomes [15]. Learning with the Problem-Based Learning model with PowerPoint animation media encourages the learning process to run optimally by making students active in learning to improve learning outcomes [16].

Learning to apply the Problem-Based Learning model with PowerPoint animation media related to fractional operations material has a positive effect, especially on student learning outcomes. This is shown by the results of observations on learning, where there is enthusiasm in working on the test questions given. Students are invited to be able to solve problems that are

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commonly used in students' daily activities. Student learning outcomes can increase if students are directly involved in participating in learning. Through this explanation, it can be concluded that there is a sharp influence on student learning outcomes after the application of the Problem-Based Learning model with PowerPoint animation media on students' fractional operations material, where students are directly involved with learning that is made attractive so that learning will be more memorable.

Applying problem-based learning with PowerPoint animation to cooperative attitudes can increase learning activities, especially in group activities [1]. Learning with Problem-Based Learning through PowerPoint animation can make students responsible for the group to improve students' cooperative attitudes [17]–[19]. Applying the problem-based learning model through PowerPoint animation related to fractional operations material influences students' collaborative attitudes. This is evidenced by the observation of the implementation of learning, which shows cohesiveness in groups to solve problems and positively impact students' cooperative attitudes. So, it can be concluded that there is a significant influence on students' collaboration attitudes after applying the Problem-Based Learning model with PowerPoint animation media on fractional operations material.

The Problem-Based Learning model makes students active in learning and more enthusiastic about working together to solve learning problems to improve learning outcomes and students' cooperative attitudes [17], [20], [21]. Learning the Problem-Based Learning model with PowerPoint animation media supports students in helping each other in a group solve problems and improve learning outcomes and students' cooperative attitudes [22]. So, it can be concluded that there is an evident influence on learning outcomes and students' collaboration attitudes after using Problem-Based Learning with PowerPoint animation.

Based on the research results, some facts influence students' understanding and the aftermath of using the problem-based learning model with PowerPoint animation media on learning outcomes and students' cooperative attitudes toward fractional operations material. This is evidenced by applying the problem-based learning model with PowerPoint animation media, significantly affecting learning outcomes and students' collaborative attitudes.

CONCLUSION

The existing research results significantly influenced the understanding of third-grade students at Merdeka Elementary School before and after using the Problem-Based Learning model with PowerPoint animation media on learning outcomes and cooperative attitudes on fractional operations material. For this reason, this research can provide an overview of the learning process that is still not going well. Teachers can apply the problem-based learning model with PowerPoint animation media to learn outcomes and cooperative attitudes in fractional operations material. In this case, the advice given by researchers is that teachers must be able to choose concepts and learning media that suit students' abilities and the material. There were limitations at the time of the research. Namely, the study was only carried out in 3 lessons. Researchers have high hopes regarding this research because it can increase the value of problem-solving-based learning and improve the quality of technology in education.

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