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The Effect of The Multimedia-Assisted Problem-Based Learning Model on Student Learning Motivation

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Abstract: This study aimed to determine the multimedia-assisted problem-based learning model's effect on motivation in mathematics studies learning. This quasi-experiment study used a nonequivalent control group pretest-posttest design. The study sample was all grade students at SD Negeri 4 Pringgabaya, which comprised 60 students and two classes using a non-probability sampling. To collect data using questionnaires. The experimental results show that the multimedia-assisted problem-based learning model positively impacts motivation in mathematics studies learning. This indicates that the pretest average in the experimental class is 43.33, while the post-test average is 76.50. The average pretest score in the control class was 47.80, while the average post-test was 69.33. Based on the T-Test analysis, the significance value obtained from the process results is 0.009 < 0.05, so Ho is rejected and Ha is accepted. Based on the n-gain test, the increase in student learning motivation in the experimental class is in the quite effective category with a value of 60%, while the increase in student learning outcomes in the control class is in the ineffective category, namely 39 %. So that, motivation Study students who are taught using a problem-based learning model assisted by multimedia are sufficient effective in increase motivation Study Mathematics students.

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Introduction

Education is a conscious effort teachers make to help students learn. Education is also interpreted as a window to the future because education gives birth to future future generations. Education in the 21st century is characterized by the rapid development of science and technological progress (Mardhiyah et al., 2021). This is very influential in the world of education. In this era, students have an essential role in the learning process. Various competencies demanded include creativity and *innovation, critical thinking and problem-solving, communication*, and *collaboration* (Muhibbin et al., 2021). Schools as formal educational institutions systematically carry out teaching, guidance and training programs in order to help and direct students to develop their competencies. Through schools, teachers as determinants of the quality of education need to understand children's stages of development in terms of how they think, act and behave (Matara, 2023).

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Along with the times, an educator must adapt to global developments, such as advances in science and technology. Teachers must be responsive and listen to the latest stories in the world of education so as not to be outdated. Similarly, in achieving learning objectives, teachers must create an engaging, creative, innovative and fun learning process to run smoothly (Bukit et al., 2023). The role of teachers in the learning process is more as a motivator, facilitator and moderator for students (Muhtarom et al., 2020). Teachers and students must work together by establishing interaction between teachers and students, students with learning resources and between students. Through this interaction, students can be motivated and build their knowledge actively to achieve the expected competencies and goals.

Learning motivation is an energy or drive within a person characterized by the emergence of feelings, reactions, and responses to something (Kurniawan et al., 2022). Motivation in the learning process is needed as an initial stage to encourage the material to be learned. One form of reason in the learning process is to provide explanations using learning media. According to (Wahyuningtyas et al., 2021), teaching media can foster student motivation in the learning process and create an exciting and fun learning atmosphere**.** Teacher creativity in designing learning is a benchmark for improving the quality of the teaching and learning process, because the higher student learning motivation will impact learning outcomes (Suprapto, 2017; Saputra et al., 2018). The success of learning objectives depends on how enthusiastic students are in participating in learning activities. Thus, the importance of student motivation in learning requires teachers to be skilled in designing learning.

Based on observations on Monday, June 13, 2023, conducted at State Elementary School 4 Pringgabaya and interviews with grade V teachers, a problem was the lack of motivation to learn Mathematics students. This can be seen from the learning results of 60 students; only 10% of students are active in learning activities, and most students are still below Criteria Minimum Completeness 70. In addition, when viewed from the way of teaching, teachers in learning Mathematics tend only to use conventional models using media such as textbooks, whiteboards and the surrounding learning environment, as well as lecture and assignment methods, resulting in students quickly feeling bored and less enthusiastic in following the learning process. Especially for students who lack understanding of Mathematics concepts such as material related to Multiplication and Division of Fractions, students are reluctant and not severe in learning. Teachers have not optimized learning media that can foster students' enthusiasm and passion for learning. One way to optimize the problem is to use interactive learning models such as the *problem-based learning* (PBL) model.

The *problem-based learning* (PBL) model is one following the demands of 21st-century education. PBL is a learning that presents various authentic and meaningful problems (Yew et al., 2016). The PBL model is a very effective learning model to improve the quality of teaching and learning activities because, in learning activities, students are required to play an active role in learning and are expected to be able to use higher-order thinking skills, hone cohesiveness and cooperation in a team/group (Octavia, 2020). According to (Fitri et al., 2020), the PBL model provides more opportunities for students to express ideas or ideas explicitly, providing experiences that have a relationship with the concepts of experiences that students have had before. Another opinion was expressed by (Susanti et al., 2021) that PBL requires students to think and solve problems while teachers still act as guides and facilitators in the learning process. Based on this opinion, it can be understood that a learning model will be better if combined or combined with innovative learning media. This is under the demands of

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a professional teacher, namely having pedagogic, personality, professional and social competencies (Setiawan et al., 2021).

One of the pedagogical competencies that a teacher must have is being able to utilize technology in carrying out learning. In applying learning materials, an educator must consider technology under the times (Wibowo et al., 2022). One media that utilizes technology that can be used in schools is multimedia. According to (Nuha et al., 2022), multimedia influences student motivation and learning outcomes. This aligns with the research results (Nurindah, 2019) that the use of multimedia in thematic learning affects student motivation and learning outcomes, as evidenced by the average post-test score between the two classes, which has significant differences. The learning outcomes will also increase with the increase in student motivation in learning**.** Another opinion was expressed by (Kurniawan et al., 2022) that the use of the PBL model can make students active in following the learning process because students are directly involved so that it can increase their curiosity and learning motivation. Thus, the learning process using multimedia is proven to increase student learning motivation so that it affects learning outcomes.

In the learning process, using learning media is very important because learning media can help teachers deliver material to students. According to (Lauc et al., 2020), using interactive learning media can make learning activities more interesting, fun and educational and student learning motivation is more positively correlated with learning outcomes. Interactive learning media is believed to increase student motivation and learning success (Mulyani, 2019). Using suitable media to convey messages or information needed by students in the learning process requires the right way of delivery to foster student learning motivation. For teachers, learning media has benefits in creating reasoning for students helping students develop actively and creatively in following learning (Purba et al., 2022). In addition, if a teacher wants the advantages of technological tools (animation, simulation or video) in transferring knowledge and information, the technical means used must be under students' level of expertise (Ramadan et al., 2019). The multimedia used in this study is interactive multimedia. This means that teachers teach using Fractional material created using the "Canva" application in the form of MP4 videos.

According to (Siregar et al., 2021), using learning media created using the "Canva" application can increase student learning motivation. Canva is an application that helps and supports the learning process carried out visually and can train students' visual literacy skills (Poerna Wardhanie et al., 2021). Another research was put forward by (Wati et al., 2022), that Canva provides benefits for teachers in preparing teaching materials with attractive design facilities so that teachers can innovate in making a work. Research Arisanti and Adnan (2021) suggests that using interactive multimedia in the learning process can increase student learning motivation. Thus, the use of the multimedia-assisted PBL model will greatly support the teacher's role in learning. Especially in this digital era very support learning students at school , so teachers are required to be creative in designing learning to create quality education.

Based on this explanation, the researcher aims to overcome the problem of student motivation in Mathematics learning by applying a multimedia-assisted problem-based learning model in class V State Elementary School 4 Pringgabaya.

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Research Method

This research was carried out at State Elementary School 4 Pringgabaya, Pringgabaya District, East Lombok Regency, NTB Province, in the odd semester of the 2023/2024 academic year. The goal is to find out whether there is an influence of *problem-based* learning models on student learning motivation. Based on these objectives, researchers used *quasi-experimental* research methods with a *nonequivalent control group pretest-posttest design*. According to Karunia (2017), quasi-experiments are very suitable for research related to education or learning because selecting research samples is based on intact groups in one class. The examples used in the study were all class V students, totalling 60 people consisting of two classes, namely 30 VA students as an experimental class and 30 VB students as a control class with *non-probability sampling* techniques (saturated *sampling*).

Data collection is used in the form of questionnaires. The creation of learning motivation questionnaire instruments is arranged based on learning motivation indicators such as the desire and desire to succeed, the drive and need to know, the future hopes and aspirations, the appreciation of learning, the existence of exciting activities in learning, and the existence of a conducive learning environment. This Mathematics learning motivation questionnaire consists of 40 statements containing written statements that must be answered or filled in by respondents per the instructions for filling out the questionnaire. Questionnaires were chosen as a learning motivation data collection technique because questionnaires can reveal conceptual variables. The instruments are distributed during the *pretest* and *post-test*. *The pretest* is given before learning, while the *post-test* is given after learning. The media used is interactive multimedia made in the form of MP4 videos using the "Canva" application, which has been tested for the validity of its content by learning media experts.

Before the trial, the learning motivation questionnaire was tested for the validity of its contents involving two experts, and the analysis used Aiken's V formula. After the questionnaire was declared valid, researchers conducted a trial to get an idea of the feasibility of each questionnaire item. The trial was carried out on 26 grade V elementary school students outside the school where the study occurred. Test the validity of questionnaire items using the *product moment correlation* formula with a total statement of 40 items, as for the reliability test of the questionnaire using the *Alpha Cronbach* technique. Data analysis in this study used prerequisite tests, namely normality tests and variance homogeneity tests, to determine whether the two data obtained were regular and homogeneous. The technique used to test the hypothesis of this study is the t-test. Finally, researchers analyzed the average pretest and post-test scores with the N-gain test to determine the increased learning motivation in the experimental and control classes. Thus, to facilitate calculations, we used the help of the *SPSS 21 application for Windows*.

Result and Discussion

The first step that the author did was to compile the content validity data obtained, namely the analysis results of the two learning motivation validators obtained through the content validity test using Aiken's V formula. Then, after the instrument is tested for the validity of its content, a construct validity test is carried out, namely by measuring the validity of statement items that have been made based on learning motivation indicators. The trial was carried out on 26 students, obtaining the table's r value with n = 26 students, which is 0.388. From 40 points of statements, 30 points of opinions were obtained, which were declared more significant

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than the r table with a range of r count 0.43 - 0.86. ten statements are expressed less than the r value of the table. So, it can be concluded that as many as 30 points of view are valid, and ten items are declared void/invalid.

Furthermore, testing the reliability of statement items obtained a coefficient of reliability of learning motivation instruments of 1.04. This means that the instrument's reliability is included in the very high category so that the instrument is reliable.

The second step that the author does is to compile the data that has been obtained. After the *pretest* and *post-test* data were collected, the researcher calculated the average value of the variables. The average calculation result is as in Table 1. Based on Table 1. the experimental class's highest and lowest pretest scores were 70 and 21 with 30 students, while the control class's pretest was 70 and 28 with 30 respondents. The highest and lowest *post-test* scores in the experimental class were 95 and 58 with 30 respondents, while in the control class, 84 and 40 with 30 respondents; this showed that learning motivation in the experimental class was higher than in the control class.

Table 1. The Value of Student Mathematics Learning Motivation

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Pretest_Experiment	30	21	70	43.33	9.866
Posttest_Experiment	30	58	95	76.50	10.009
Pretest_Control	30	28	70	47.80	12.683
Posttest_Control	30	40	84	69.33	10.367
Valid N (listwise)	30				

The following data on the results of the learning motivation normality test using statistical tests as in Table 2 below.

Table 2. Normality Test of Student Learning Motivation

One-Sample Kolmogorov-Smirnov Test

		_Experiment	Control
N		30	30
Normal Parameters[a]	Mean	76.50	69.33
	Std. Deviation	10.009	10.367
Most Extreme Differences	Absolute	.126	.205
	Positive	.108	.085
	Negative	-.126	-.205
Kolmogorov-Smirnov Z		.691	1.122
Asymp. Sig. (2-tailed)		.726	.161

a. Test distribution is Normal.

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Based on the results of the *One-Sample Kolmogorov-Smirnov Test*, all *post-test* data of the experimental group and control group showed that the sig value *(2-tailed)* was > 0.05. They are 0.726, 0.05 and >0.161 > 0.05. So, it can be assumed that the data is typically distributed. This is reinforced by the image on the histogram chart, as shown in figure 1.

Experiment Control

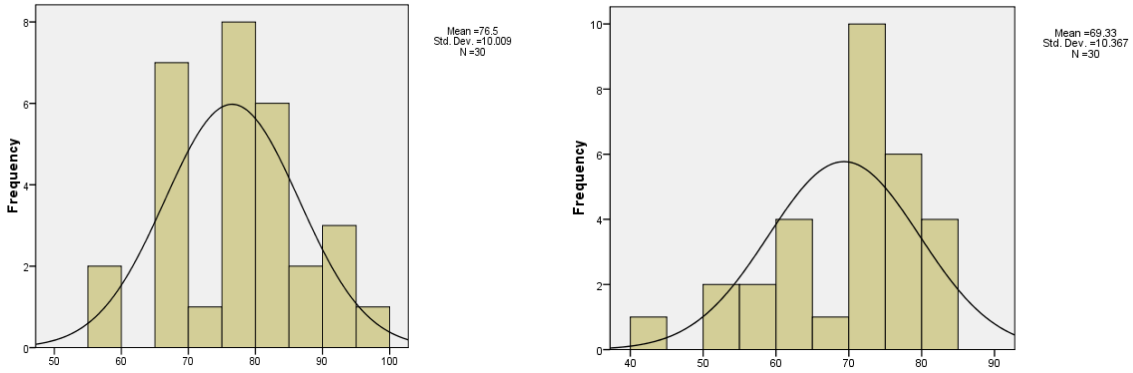

Figure 1. Normality Test with Histogram

Based on Figure 1, the histogram graph in the experimental and control classes shows a data balance; that is, the curve does not experience an astonishment to the right or left, so the histogram graph is declared normal.

After the two research samples were declared normally distributed, homogeneity testing was then carried out using the help of the *SPSS 21 for Windows* application. A homogeneity test is performed to determine whether the experimental class and control class data have the same variance. The homogeneity test criterion is if the sig value. 0.05, then the variance of the group is homogeneous, and if the sig is 0.05, then the group's variance is not homogeneous. The following data on homogeneity test results ><as in Table 3 follows:

Table 3. Homogeneity Test Results

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Itself.
Learning Motivation	Based on Mean	.029	1	58	.865
	Based on Median	.027	1	58	.870
	Based on Median and with adjusted df	.027	1	54.898	.870
	Based on trimmed mean	.001	1	58	.973

Based on the table above, the sig value is obtained. *Based on Mean* 0.865 0.05, the experimental class and >control class post-test data variance is equal or homogeneous. So,

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testing using *an independent sample t-test* has been fulfilled to continue with the hypothesis test.

Hypothesis testing in this test is carried out using the t-test with the help of *SPSS 21 for Windows*. The t-test is used to determine the effect of the independent variable on the dependent variable, namely the variable of *the problem-based* learning model on student learning motivation. Hypothesis testing using the t-test is carried out with the criteria: if the significance value is 0.05, then Ho is accepted, and if the significance value is 0.05, then Ha is accepted. The results of hypothesis testing >< are as in Table 4 below:

Table 4. Test Results *Independent Sample T Test*

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Itself.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Learning Motivation	Equal variances assumed	.029	.865	2.724	58	.009	7.167	2.631	1.900	12.433
	Equal variances not assumed.			2.724	57.929	.009	7.167	2.631	1.900	12.433

From Table 4, it can be known the value of sig. *(2 tailed)* of 0.009. This means that this value is less than 0.05. So Ho was rejected, and Ha was accepted, so it can be stated that there is a significant difference in increasing the learning motivation of students who use the <*problem-based* learning model with students taught using conventional learning models. This is proven by testing the hypothesis using the n-gain test. Based on the results of the n-gain test, the increase in learning motivation in the experimental class in the low category is 0.60. If it is based on the interpretation of the effectiveness of n-gain in the category is quite adequate, it is 60. The increase in the control class was 0.4, and if based on the interpretation of the effectiveness of n-gain, it is included in the ineffective category of 39.5. These results follow Anik Setyowati's (2022) research, stating that applying *problem-based* learning models in learning can increase motivation and affect student learning outcomes. This is also proven by Muhammad Fakhri Nuha (2022) that students who are taught using a *multimedia-assisted problem-based learning* model are better than students who are prepared without using multimedia.

By using a multimedia-assisted problem-based learning model, students gain increased learning motivation. This is proven by testing the hypothesis using the n-gain test. Based on the results of the n-gain test, the increase in learning motivation in the experimental class in the

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low category is 0.60. If it is based on the interpretation of the effectiveness of n-gain in the category, it is quite effective, which is 60%. The increase in the control class was 0.4, including the low category and if based on the interpretation of the effectiveness of n-gain included in the ineffective category of 39 %. Thus, learning using *a multimedia-assisted problem-based* learning model further increases student motivation in learning Mathematics.

The multimedia-assisted problem-based learning model shows a difference in the motivation to learn Mathematics of students who are taught with a multimedia-assisted *problem-based learning* model with those who use conventional models. Descriptively, the average value of student motivation in the experimental class was higher than in the control class. This aligns with the findings (Fitriani et al., 2023), that the PBL model is very influential in increasing student learning motivation because applying the PBL concept allows students to build their skills in solving problems independently. This means that the model can indirectly increase student motivation and create active learning in the learning process. According to (Santi, 2019), a person's motivation will grow if it is directly related to the actual aspects that occur around him. Thus, it can be concluded that using the PBL model can guide students in conducting simple investigations. Research conducted by (Dewi et al., 2022) shows that the *problem-based* learning model can effectively increase science learning motivation in grade V students, evidenced by an increase in learning motivation indicators per cycle. Students are more diligent, tenacious in solving problems, enthusiastic, and interested in learning. The same results are also shown in research (Joyoleksono et al., 2022) PBL model can create learning activities that stimulate students' curiosity during the learning process in the classroom.

By providing problems related to daily life to students with group work, they are making works or reports and presenting them. The PBL model can actively motivate students to continue building their knowledge so that the mindset of students with low motivation becomes more challenged when facing learning problems (Munawaroh et al., 2022) This is also supported by the role of multimedia that can clarify the material delivered by the teacher. Multimedia makes learning more active and interactive (Astuti et al., 2018) Thus, learning like this is liked by students, so they are more motivated to follow the learning process.

Abstract mathematics learning can be easily understood using multimedia, which is inseparable from the advantages of the problem-based learning model. This model provides many opportunities for students to be active in the learning process (*student centre*). Following the demands of the 21st century, which requires students to be able to think critically, be able to solve problems and collaborate between students (Panggabean et al., 2021) Indirectly, the demands of this century can be trained. Success in using media will significantly affect the increase in learning motivation. Learning activities are vital to be designed so that the mindset of students can be formed so that students can continue to learn and be active in the learning process. Therefore, educators need to carry out exciting activities and use innovative student-centred learning models to improve the quality of education in schools.

Conclusion

Based on the results of research and testing conducted, it can be seen that there are differences in the final results of students who learn using multimedia-assisted problem-based learning models and students who know using conventional models. This can be seen from the results of the t-test analysis obtained sig values. From the *post-test* results, which are 0.009 <

0.05. So Ha was accepted, and Ho was rejected. There are significant differences in the learning motivation of students taught using multimedia-assisted problem-based learning models and those trained using conventional models.

Recommendation

Based on these conclusions, can be put forward:

1. To the principal to provide policies that can encourage teachers to be creative and innovative in preparing learning media following the times
2. Teachers are advised to consider learning models following the competencies of 21st-century students, so teachers must be able to create fun and meaningful learning.
3. For the next researcher, it is suggested that multimedia should be made as attractive as possible to arouse students' enthusiasm for learning and add research variables for the improvement of the research to be carried out.

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