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Implementing Experimental Learning Methods on Student Learning Motivation

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ABSTRAK

Permasalahan dalam penelitian ini adalah rendahnya motivasi belajar siswa. Penyebabnya karena kurang efektifnya model dan media yang digunakan. Penelitian ini bertujuan untuk menganalisis penerapan metode pembelajaran eksperimen yang efektif terhadap motivasi belajar siswa di kelas IV. Penelitian ini menggunakan pendekatan kuantitatif dengan desain pra-eksperimental berupa one-group pretest-posttest design. Teknik pengumpulan data dilakukan dengan menggunakan lembar angket. Analisis data yang digunakan dalam penelitian ini adalah analisis statistik deskriptif. Penelitian ini menyimpulkan bahwa penerapan metode pembelajaran eksperimen efektif terhadap motivasi siswa pada mata pelajaran IPA di sekolah dasar. Hasil penelitian ini menjadi referensi mengenai penggunaan metode eksperimen dalam meningkatkan motivasi belajar siswa.

ABSTRACT

The problem in this research is the low student motivation to learn. The cause is due to the lack of effectiveness of the models and media used. This research aims to analyze the application of effective experimental learning methods to student learning motivation in class IV. This research uses a quantitative approach with a pre-experimental design in the form of a one-group pretest-posttest design. The data collection technique is carried out using a questionnaire sheet. The data analysis used in this research is descriptive statistical analysis. This research concludes that the application of experimental learning methods is effective in student motivation in science subjects at elementary school. The results of this research are a reference regarding the use of experimental methods in increasing student learning motivation.

1. INTRODUCTION

The function of education is to guide students towards a goal that we value highly, namely to educate the nation's life and develop Indonesian people as a whole (Sitepu & Amelia, 2021), (Jumariah, 2020). Education is an essential means for the advancement of human resources. Increasing human resources should be given excellent attention. One of them manages the implementation of educational activities is the school (Sujana Cong Wayan I, 2019), (A.M.Irfan Taufan Asfar and A.M.Iqbal Akbar Asfar, 2019). The aim of education is to realize the national goals of the Indonesian people as stated in the 1945 Constitution, namely to make the life of the nation intelligent (Naimi et al., 2023), (Abd Rahman and Sabhayati Asri Munandar, 2022). The essence of implementing education in schools is carried out in learning activities. Through the educational process, it can provide ideas about educational problems and provisions that are directly aimed at educational actions (Andi Hasryningsih Asfar and Ady Kurnia, 2020), (Lukman Ali and Muhammadong, 2022).

Learning is essentially a process, managing, and organizing the environment around students carrying out the learning process. Learning is also said to provide guidance or assistance to students in carrying out the learning process (Andi Setiawan, 2021), (Silviana Nur Faizah, 2019). The learning process

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certainly has many differences, such as there are students who are able to digest the lesson material, and there are also students who are slow to digest the lesson material. These two differences cause teachers to be able to organize strategies in learning that suit the circumstances of each student. Therefore, to support the learning process, an understanding of learning models is needed (Dasopang M, 2019), (Djamaluddin, A., & Wardana. 2019).

A learning model is a method or strategy used by a teacher in carrying out teaching and learning activities, where these activities involve students as recipients of knowledge from learning activities (Istiningsih, 2020), (Haryanto Atmowardoyo,2023). A good learning strategy must have clear stages, so that learning objectives can be achieved. The learning model used by teachers must be able to develop students' abilities for various learning objectives. Therefore, teachers must know and understand learning models so that the learning process in class is more enjoyable and fosters students' ability to think so that the learning process becomes more effective.

Science learning is a unique art in educating someone to understand science and apply it in their lives. Wisudawati and Sulistyowati (2019), (Dewi Tila Elisa and Juliana, 2023) essentially science learning can be described as a system, namely the science learning system like other systems consists of components of learning input, learning process and learning output. Samatowa (2021), (Nurlina, 2021) Natural Science is a translation of the words in English, namely natural science, meaning natural science (IPA). Science is a human effort to understand the universe through targeted experiences, using procedures and explaining it with reasoning so as to reach a conclusion Susanto (2022), (Mohammad Muslih,2019).

The effectiveness of learning can be seen from learning motivation with the process of changing intellectual abilities (cognitive), interest or emotional abilities (affective) and fine and gross motor skills (psychomotor) in students. Changes in students' abilities in the learning process, especially in basic education units, are expected to be in accordance with their development stage, namely at the concrete operational stage, (Windasari and Muhammad Kharis Fajar, 2021), (Nasriani, 2022). With motivation to learn, we can see and assess the progress obtained by students, but the learning conditions in the last two years are very worrying due to the inappropriate implementation of learning models.

Based on observations and interviews with class IV teachers at SD Inpres 15 Wara Pantoloan, information was obtained that students' learning motivation, especially in science subjects, is known to still tend to be low, this is because teachers still use the lecture method, so learning is still less effective and students are still less active in learning. Learning results in students preferring to play rather than watching the teacher explain. This of course has a big influence on students' learning motivation in science subjects. The results of the observations that have been carried out have found several problems, namely that the achievement of grades in science subjects is still low which can be seen from the results of their report cards, there are still many students who are lazy about doing homework when the teacher gives homework and students who always forget the material given by the teacher beforehand because they don't there is repetition of material at home.

The learning process under these conditions means that in relation to motivation for learning outcomes, a learning model is needed that can develop critical thinking skills and ultimately increase students' learning motivation. Students who have high learning motivation tend to have high achievement, whereas if their learning motivation is low, their learning achievement will also be low (Azizah, et al., 2024). Students are subjects who have the ability to actively seek, process, construct and use knowledge. In order to truly understand and be able to apply knowledge, students need to be encouraged to work to solve problems, discover things for themselves, and make strong efforts to realize their ideas. One of the learning models used to overcome this situation is the experimental learning model.

A learning method is a plan or pattern that is used as a guide in carrying out learning in class or learning in tutorials. One very important learning method in elementary science learning is experimentation (Nabila Alfitriani and Wisheila Ayunisa Maula,2021), (Dwi Purbowati,2022). The experimental method can be interpreted as the most complete quantitative research approach, in the sense that it meets all the requirements for testing cause-and-effect relationships (Sukmadinata, 2019), (Fegi and Muhammad Ali, 2021). Experiments can be carried out in a laboratory or outside the laboratory. Meanwhile, the experimental method in learning is a way of presenting learning material that allows students to carry out experiments to prove for themselves a question or hypothesis being studied. General the experimental method is a teaching method that invites students to carry out experiments as proof, to check that the theory they have studied is indeed correct. Paul Suparno (2021), (Efy Sri Sujayanti, 2022).

Based on the explanation above, research is needed to determine the effectiveness of learning using the experimental learning model in class IV of SD Inpres 15 Wara Pantoloan on science material. Therefore, researchers conducted research entitled "Effectiveness of the Application of Experimental Learning Methods on Student Learning Motivation in Class IV of SD Inpres 15 Wara Pantoloan".

2. METHOD

The research design used to solve the problem is a quantitative research design with experimental research methods, namely research used to find the effect of certain treatments on others under controlled conditions. The form of experimental design used in this research is pre-experimental one-group pretest-posttest design. The population in this research is the IV students of SD Inpres 15 Wara Pantoloan, totaling 14 people. The sample in this research is class IV with 14 students who will be treated using the Experimental Learning Method. The sampling technique uses a saturated sampling technique.

The data collection technique in this research was a student learning motivation questionnaire with a total of 26 statements. Questionnaires were used to measure student learning motivation given before treatment (Pre-Test) and after treatment (Post-Test) before treatment using the Experimental learning method and after treatment using the Experimental learning method. Data analysis according to Sugiyono, (2021) is the method used regarding calculations to answer problem formulations and test hypotheses proposed in research. The data analysis used in this research is :

Descriptive Statistical Analysis

Descriptive data analysis aims to provide an overview of the achievement of learning motivation criteria scores. From the results of calculating questionnaire data for all students to measure student motivation and learning activities in the teaching and learning process in class, you will obtain a percentage value, which can be transformed into determining a benchmark percentage scale. The benchmark criteria are as follows:

Table 1 Criteria for the success of student learning motivation

Percentage	Criteria
86 – 100 %	Very Good
76 – 85 %	Good
60 -75 %	Enough
55 – 59 %	Less
< 54 %	Very Little

Source: Riduwan,2020

Inferential Analysis

Inferential analysis according to Sugiyono (2022) is a statistical technique used to analyze sample data and the results are applied to the population. Analytical techniques to answer the hypothesis in this research include normality test, homogeneity test, hypothesis test with the help of the SPSS version 22 program.

3. RESULT AND DISCUSSION

Result

This research was carried out by giving an initial test (Pre-Test) in the form of a questionnaire totaling 26 statements. After that, treatment was given using the Experimental Learning Method. After the treatment, a final test (Post-Test) was given in the form of a questionnaire totaling 26 statements.

Table 2 Results of *pre-test* data on student learning motivation

Description	Initial test ***(Pre-Test)***
Suject	14
Lowest Score	67
Highest Score	83
Average Vaule	59.6
Standard Deviation	4.268

Based on the data above, it is known that the average (mean) of class IV students is 59.6, the pre-test results obtained a minimum score of 67 and a maximum score of 83.

Table 3 Percentage of Pretest Student Learning Motivation

Indicators Of Learning Motivation	Motivational Presentation (%)	Motivation Category
Perseverance in Learning	92.57	Very Good
Tenacious in Facing Difficulties	80.10	Good
Interest and Discernment in Lessons	82.14	Good
Achievement in Learning	85,.16	Good
Independent in Learning	76.43	Good

From Table 3 above, the value of student learning motivation, perseverance in learning is 92.57% in the very good category, tenacity in facing difficulties is 80.10% in the good category, interest and sharpness in learning is 82.14% in the category good, achievement in learning, namely 85.16% in the good category, and independence in learning, namely 76.43% in the good category. So it can be concluded that students' pre-test learning motivation or before applying the experimental learning method, student learning motivation is in the good category.

Table 4 Post-Test Data Analysis of Student Learning Motivation

Description	Final Test (*Post-Test)*
Subject	14
Lowest Value	87
The highest score	96
Average value	71.2
Standard Deviation	2.954

Based on the data above, it is known that the average (mean) of class IV students is 71.2, post-test results can be obtained with a minimum score of 87 and a maximum score of 96.

Table 5 Percentage of Post Test Student Learning Motivation

Learning Motivation Indicators	Motivational Presentation (%)	Motivation Category
Perseverance in Learning	95.33	Very Good
Tenacious in Facing Difficulties	91.90	Very Good
Interest and Sharpness in Lessons	92.06	Very Good
Achievement in Learning	89.52	Very Good
Independent in Learning	91.07	Very Good

From the Table 5 above, the student learning motivation values obtained are: Perseverance in learning at 95.33% in the very good category, Resilience in facing difficulties at 91.90% in the very good category, Interest and sharpness in learning at 92.06% in the category very good, Achievement in learning was 89.52% in the very good category, and Independent in learning was 91.07% in the very good category. So it can be concluded that the Post-Test learning motivation or after applying the Experimental learning method is in the very good category.

The normality test is carried out to find out whether the data is normally distributed or not. The calculations in the normality test use the Shapiro–Wilk formula because the research sample is less than 50 with the help of the IBM SPSS Version 22 program.

Table 6 *Pre-Test* and *Post-Test* Data Normality Test

Category	Class	Shapiro – Wilk		
		Statistic	Df	Sig
Motivation to Learn	Pre – Test	0.968	14	0.853
	Post – Test	0.964	14	0.785

Based on the Table 6 above, the results of the normality test using the Liliefors Shapiro – Wilk formula with the help of the IBM SPPS version 22 program, can be seen from the significant value (sig) for learning motivation in the Pre-test class using the Shapiro-Wilk formula of 0.853 > 0.05 . For the post-test class, the Shapiro-Wilk formula is 0.785 < 0.05. So it can be concluded that the research data is normally distributed and the analysis can be continued.

The homogeneity test is carried out to find out whether samples taken from the population have the same conditions when given treatment. The test criteria are carried out to determine whether the data

variance is homogeneous or not, seen from the significant value (Sig.) > 0.05, then the data variance is homogeneous. Conversely, if the significant value (Sig.) <0.05 then the data variance is heterogeneous.

Table 7 Uji Homogenitas Data *Pre-Test* dan *Post- Test*

		Levene Statistic	df1	df2	Sig.
Motivasi Belajar	Based on Mean	0.660	1	26	0.424
	Based on Median	0.650	1	26	0.427
	Based on Median and with Adjusted df	0.650	1	21.007	0.429
	Based on Trimmed Mean	0.660	1	26	0.424

Based on the Table 7 above, it shows a significant value (sig) of 0.424 > 0.05 so it can be concluded that the Pre-test and Post-test data are homogeneous. Testing of the Effectiveness of the Application of Experimental Learning Methods on Student Learning Motivation in Science Subjects in Class IV of SD Inpres 15 Wara Pantoloan. Using Paired Sample T Test analysis using the IBM SPSS version 22 program. Paired Sample T Test is a parametric test that can be used on two paired data. The purpose of this test is to see the significant effect between two paired samples with the assumption that the data is normally distributed.

Table 8 Paired Samples Test

		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Pre Test Post Test	-11.57143	1.65084	0.44121	-12.52460	-10.61826	-26.227	13	0.000

If the sig value. (2-tailed) < 0.05, then the application of the experimental learning method is effective between student learning motivation in the pre-test and post-test data. And if the sig value. (2-tailed) ≥ 0.05, then the application of the experimental learning method is not effective between student learning motivation in the pre-test and post-test data. Based on the data above, it is known that the sig. (2-tailed) of 0.000 < 0.05, it can be concluded that the application of the experimental learning method is effective on student learning motivation in the Pre-Test and Post-Test data.

Discussion

Teachers play an important role as facilitators so that students are more enthusiastic about learning so that students' learning motivation increases. The purpose of this research is to determine the application of effective experimental learning methods to student learning motivation in class IV SD Inpres 15 Wara Pantoloan.

In the experimental class before treatment, the lecture and question and answer method was used only. After that, carry out the learning process with treatment using the experimental learning method. It is known that increasing learning motivation uses the experimental method in delivering science subjects. The advantage of this method is in planning the problem and how to solve it. The selection of problems presented is adjusted to material that is suitable for students to study. The material studied in this research is changes in the form of energy.

When delivering material on changes in forms of learning energy using the experimental learning method is more effective than delivering learning using the lecture and question and answer method. The experimental method is a way of teaching, where students carry out an experiment on something, observe the process and write down the results of the experiment, then the results of the observation are presented in class and evaluated by the teacher, Roestiyah, (2020), (Hamdayama,2021). This is because this experimental method is in accordance with the development of SD Inpres 15 Wara Pantoloan students. Presenting problems in an interesting way, such as direct practice (experiments) when learning and providing interesting learning videos. Providing problems related to everyday life trains students to think more critically.

In the initial experiment step, the teacher distributes LKPD related to the experiment to be carried out. The teacher asks students to read the steps in conducting an experiment. Then students prepare tools

and materials such as candles, paper, scissors, matches and rulers. Next, students draw on the paper that has been provided to form a circle like a mosquito repellent, then cut out the paper following the circle that has been drawn, light the candle using a match, after that the teacher gives an example of the experiment that will be carried out. Next, students carry out experiments with each group and are supervised by the teacher. At this stage I can see the students' enthusiasm or motivation to learn from the start of preparing tools and materials and fighting for what they want, such as some who immediately grabbed scissors, some who were enthusiastic when I drew the circle, etc.

At the stage of making observations, students make observations from the experiments that have been carried out, where each of their group friends divides the tasks by means of someone who carries out the experiment, a burning candle is given treatment by using paper that has been cut earlier and placing the paper on the flame of the candle so that it does not burn. . Another friend wrote down how many revolutions would occur if the paper was placed on a candle flame. Then another friend measured the distance between the candle flame and the paper using a ruler. From the results of observations made by each group, each group will get the results of what has been concluded through the experiment. At this stage, students are always enthusiastic about the things they have taken in the initial stages and each of them focuses on the things they really want, but there are still students who are indifferent to the experiments that have been carried out by each group.

In the initial hypothesis stage, students were directed to each group to provide a tentative answer as to how far apart the paper placed on the candle flame would be to produce rotation on the paper.It turns out that after carrying out the experiment, students can find out that if the paper is placed on the candle flame, if the distance between the paper and the candle flame is closer, the paper will spin faster and if the distance between the paper and the candle flame is farther, the paper will spin less or slow.

The use of experimental methods in science learning can provide space for students to optimize their abilities. The advantages of the experimental method are: 1) This method can make students believe more in the truth or conclusions based on their own experiments rather than just accepting the teacher's word or book. 2) Can develop an attitude of conducting exploratory studies about science and technology, an attitude of a scientist. 3) This method is supported by modern didactic principles, including: (a) students learn by experiencing or observing processes or events themselves; (b) students avoid verbalism; (c) enriching experience with things that are objective and realistic; (d) develop a scientific thinking attitude (e) learning outcomes will be long-lasting and internalized, Syaiful Sagala (2019), (Ninditya Enggawati Hayuningtyas, 2019. Apart from that, the effect of the experimental method can be seen based on the results of the questionnaire observation guidelines that have been given to students, which can be increased through the pre-test and post-test.

Based on quantitative analysis, students' initial learning motivation by giving an initial test shows that the average score is 59.6. After being given treatment, the students' final ability by giving a post-test revealed that their average score was 71.2. These results show that there is a significant difference in scores between the initial test and the final test. This result is supported by the results of the hypothesis test (t-test). Where from the calculations a significant value was obtained ($0.000 < 0.05$), in other words the application of the experimental learning method was effective on students' learning motivation before and after being given treatment. After carrying out proof through pre-test and post-test using the t-test, it can be seen that testing the research hypothesis, the application of the experimental learning method is effective on student learning motivation in science subjects in class IV of SD Inpres 15 Wara Pantoloan.

Application of Experimental Learning Methods to Student Learning Motivation in Science Subjects in Class IV of SD Inpres 15 Wara Pantoloan. The findings of this research are supported by the results of previous research. Entitled the effectiveness of learning using experimental methods to improve science process skills Arinta Priliana Purwita (2020), Therefore, it can be seen that learning using the experimental method is effective in improving students' science process skills. This is shown by the level of use of science process skills by each student reaching good criteria, in every aspect reaching good criteria, and N-Gain reaching medium to high criteria. Learning using the experimental method is also able to bring students to the level of complete learning. The completeness of students' cognitive aspect learning outcomes has exceeded the minimum completion limit and the N-Gain of students' cognitive aspect learning outcomes has reached medium criteria. The relevance of this research is the research focus which uses experimental methods to increase student learning motivation in the classroom. The difference between this research lies in the research objective which focuses on increasing students' learning motivation, while this research focuses on students' skills in class.

Research conducted by M. Azka (2020), revealed in research entitled the influence of experimental methods on the motivation and learning outcomes of class X students on rectilinear motion material. Therefore, it can be seen that the experimental method makes students more motivated to follow the lesson. This is evident from the results of the significance test which shows that students' learning motivation using

the experimental method is higher than the lecture method. Student learning outcomes using experimental method learning are also better than lecture method learning, so it can be concluded that there is a positive influence between the experimental method on student motivation and learning outcomes. The relevance is that this research uses experimental methods to motivate students to learn. The difference with this research is only the difference in the research subject.

Research conducted by Fitran Sari (2019), revealed in research entitled the application of experimental methods to increase student learning motivation. Therefore, it can be seen from the results of this research that the application of the experimental method can increase the learning motivation of class VIII-3 students on Simple Airplane material. The relevance is that this research uses experimental methods to motivate students to learn. The difference with this research lies in the type of research, where this research used classroom action research, while the research I conducted used quantitative research..

Based on the information above, it can be concluded that students' learning motivation before and after using the experimental learning method experienced significant changes. Because the learning situation makes students want to know more deeply, so students are more active in interacting with their friends. Even though some students are still playing here and there, student motivation in the learning process can increase. This is reinforced by the results of the t-test analysis of student learning motivation questionnaires which show that the application of experimental learning methods is effective on student learning motivation in science subjects.

4. CONCLUSION

Based on the results of research conducted at SD Inpres 15 Wara Pantoloan, it can be concluded that the experimental learning method is effective for student learning motivation in science subjects in class IV at SD Inpres 15 Wara Pantoloan. The results of data analysis in this research show that the experimental learning method is effective on students' learning motivation in science learning compared to those using lecture and question and answer methods. Based on research experience that has carried out research, the following suggestions that researchers can give to several parties are as follows: Teachers should be able to create a learning atmosphere that can make students happy to learn, so that students can develop critical thinking patterns in the learning process. The model that can be used is the experimental learning method, Students should be involved in the learning process so that students can discover their own concepts and can engage their minds critically during learning, Future researchers are expected to be able to continue research using experimental learning methods by measuring other existing variables for further learning or for different material and content.

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