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Interest and Learning Outcomes in Natural Science of Grade IV Students of Singajaya Elementary School

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ABSTRACT

This research aims to evaluate the effect of the Learning Cycle 5E learning model on the interest and achievement of science learning of grade IV students at Singajaya Elementary School, Indramayu Regency. The research method used was experimental, with 20 students as participants. The research used an experimental method with steps: determining the problem, preparing instruments, determining samples, collecting, analyzing data, and preparing reports. The research results show that the Learning Cycle 5E learning model positively influences the increasing interest and learning achievement of fourth-grade students at Singajaya Elementary School, Krangkeng, Indramayu Regency. The analysis results with SPSS 26 showed an average N-Gain value of 0.61 for increased interest in learning and 0.47 for increased learning achievement. This research recommends applying the 5E Learning Cycle model to increase student interest and learning outcomes.

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1. INTRODUCTION

Many changes occur in life every day, including in the field of education. In Indonesia, there are changes in the curriculum, which initially used the 2006 KTSP to become the 2013 curriculum. The curriculum is a series of plans and rules that include content, learning materials, and methods used in learning [1].

The curriculum is created with the hope that teachers can adapt more quickly to master the new curriculum and then apply it in learning to achieve a better level of education. Primary education is the most critical stage because the knowledge gained from primary education will be used as capital to continue to the next level of education. Therefore, improving the quality of education at the primary school level is possible. This can be achieved through more interesting learning, such as increasing interest to achieve student learning outcomes.

Students do not always feel enthusiastic when learning; sometimes, learning feels boring. This is one of the signs of a reduction in student interest in learning. Some signs that students' interest in learning is reduced are the lack of enthusiasm, attention, and seriousness of students in participating in learning. Increased student interest in learning can occur if the teacher is a mediator, and the facilitator can choose a learning model that is constructive, innovative, varied, meaningful, and fun. The Learning Cycle 5E learning model is a model that can increase students' interest in learning.

The Learning Cycle 5E model is a collection of activity steps designed so that students can master several competencies required in learning [2]. This student-centered model can potentially broaden educators' horizons and increase student creativity. In addition, implementing the Learning Cycle 5E learning model can motivate students, increase the meaning of learning, increase students' enthusiasm for learning, and restore their interest in the lesson so that it can affect learning outcomes.

One of the subjects in elementary school that can be integrated with the Learning Cycle 5E learning model is science learning. Science is a family of sciences with unique characteristics in studying factual natural phenomena related to actual events and cause-effect relationships. The materials in science study various natural phenomena and require more reasoning by students [3].

The reality currently found at Singajaya Elementary School, based on interviews with homeroom teacher IV on May 25, 2021, is that the science learning process is not running optimally. This is evident from the 20 students in class IV; 12 declared to have incomplete learning outcomes. This fact occurs because students often do not understand the lesson, affecting the Maximum Completeness Criteria (KKM), which is 70.

A lack of interest in learning can cause a decline in students' learning ability. The delivery of material using the old method (conventional) dramatically affects students' interest in learning and their ability to understand the material. Teachers should familiarise students with explaining concepts and learning materials using their language so that they will more easily understand the material.

A learning model based on the 5E Learning Cycle is one of the right solutions to overcome these problems and realize learning that can revive the potential of student interest and learning outcomes. The existence of innovation in learning can improve the science learning process in elementary schools, especially regarding the material on parts of plants and their functions.

Based on this, the author feels interested and needs to research the learning model "Interest and Learning Outcomes In Natural Science of Grade IV Students of Singajaya Elementary School."

2. METHOD

Methods are the primary means to achieve a goal, while research methods are scientific approaches to obtain data with specific purposes and benefits [4]. This research applies experimental research methods to examine the impacts of treatment on other variables under controlled conditions. The approach used is quantitative, based on the

philosophy of positivism and involves collecting data from a specific population or sample using statistical research instruments [5].

This study uses a pre-experimental design, precisely a one-group pre-test post-test, where only one experimental group is given a test before and after implementing the learning model. The experimental method was applied to evaluate the impact of the Learning Cycle 5E learning model on interest and science learning outcomes for grade IV students at Singajaya Elementary School, Krangkeng District, Indramayu Regency.

This research design involved an experimental group that was tested before and after treatment: first, a pre-test (O1) was conducted to assess initial understanding; next, the Learning Cycle 5E learning model was applied (X); finally, a post-test (O2) was conducted to compare the difference between pre-and post-treatment scores.

The dependent variable that focuses on this research uses a learning model based on the 5E Learning Cycle. The independent variables that are the focus of this research are the interest and learning outcomes of science in class IV Singajaya Elementary School, Krangkeng, Indramayu. This research compares changes in independent variables before and after implementing the learning model.

Population in a study refers to all objects or subjects with specific characteristics chosen by the researcher to conclude from the research results. Meanwhile, the sample is a representative part of the population.

In the context of this study, the population consists of 125 students in the Singajaya Elementary School, Purwajaya Village, Singajaya Block, Krangkeng District, Indramayu Regency in the 2020/2021 academic year. The saturated sampling technique is used as a sampling technique where the sample taken from the population is:

Table 1. Research sample

Class	Total	Description
IV	20 Students	Experiment Class

Data collection techniques are an essential aspect of research, and they can be done through various means such as observation, interviews, and questionnaires [5]. In research, data collection techniques are fundamental and can be done through observation, interviews, and questionnaires. This study used various data collection techniques, including unstructured interviews, questionnaires, tests, and documentation.

An unstructured interview is free, where the researcher does not use an interview guide prepared systematically and thoroughly to collect data [6]. This interview was conducted as an initial step to obtain information about the science learning process in class IV at Singajaya Elementary School, Krangkeng, Indramayu.

The questionnaire data collection method delivers questions or written statements that respondents can answer [4]. The use of questionnaires aims to assess the level of student interest in Singajaya Elementary School, Krangkeng, Indramayu Regency. A test is an evaluation method by presenting a series of questions or tasks that must be completed or answered [7], [8]. The use of tests aims to measure the level of student achievement before

and after applying the Learning Cycle 5E model of learning at Singajaya Elementary School, Krangkeng, Indramayu Regency.

Documentation refers to data collection methods that involve books, archives, documents, numerical data, and images included in reports and information that support the research. In this study, the documentation technique was utilized to gather data on the learning activities of fourth-grade students at Singajaya Elementary School, Krangkeng, Indramayu Regency.

Research instruments refer to tools used to measure phenomena in the context of the study, both in natural and social aspects. In the context of this research, the instruments to be used include:

a. Questionnaire

As an indirect data collection technique where researchers do not interact directly with respondents [9], the questionnaire instrument was prepared to measure students' interest in science subjects, including liking, interest, concentration, and student involvement in science learning. The components measured include learning regularity, task completion, and students' tendency to ask questions when experiencing difficulties. This questionnaire was given twice. A Likert scale with four answer options was used in the questionnaire before and after the study.

b. Test Questions

As a measurement and assessment tool in education [10], the test question instrument measures improvements in science student learning outcomes before and after implementing the Learning Cycle 5E learning model. The test questions are designed to reflect student performance in the learning material.

Data analysis is an essential stage in research after collecting data from all respondents. This process involves grouping data based on variables, presenting data, making calculations to answer the problems, and applying statistical calculations.

The instrument test in this study includes several stages:

a. Validity Test: This involves measuring the validity level of the instrument used. The instrument's validity level is considered feasible if the test results (r-count) are more significant than the value listed in the table (r-table) at the 0.05 significance level.
b. Reliability Test: It is an attempt to measure the level of accuracy or reliability of a measuring instrument. The reliability coefficient (r11) should be greater than 0.6 for the research instrument to be considered reliable.
c. Difficulty Level: Describes a test question's degree of difficulty or ease. The difficulty level category is defined as difficult, moderate, or easy according to predetermined criteria, which refers to the classification of difficulty levels [11].
d. Distinguishing Power: Assesses the ability of an item to differentiate between high and low-ability students. The differentiation criteria are divided into four categories: poor, fair, good, and excellent, based on the discrimination index (D), which ranges from -1.00 to 1.00.

In addition, there are three additional tests conducted in this study:

a. Prerequisite Test: The normality Test is used to evaluate data distribution. If the significance is greater than 0.05, the data is considered to have a normal distribution.
b. Hypothesis Test: Conducted on the interest and learning outcomes of IPA Plant Parts and Their Functions after applying the treatment using paired samples t-test on the SPSS 26 program. H0 (null hypothesis) is rejected if the significance is < 0.05 and accepted if the significance is greater than 0.05.
c. Normalized Gain (N-Gain) Test: Aims to measure the improvement in interest scores and learning outcomes before and after treatment, referring to the formula and assessment described by Sundayana [12].

$$N - Gain = \frac{skor\ posttest - skor\ pretest}{skor\ ideal - skor\ pretest} \quad (1)$$

Table 2. Normalized n-gain criteria

Normalized N-Gain Value	Interpretation
0,7 ≤ n ≤ 1,00	High
0,30 ≤ n ≤ 0,70	Medium
0,00 ≤ n ≤ 0,30	Low

Reference: Oktavia et. al [13]

3. RESULTS AND DISCUSSION

This section explains research results such as the normality test, hypothesis test, and N-Gain test and a comprehensive discussion.

3.1. Research Results

The prerequisite test was conducted first to determine whether the Learning Cycle 5E-based learning model impacted increasing interest and learning outcomes in the science of fourth-grade students at Singajaya Elementary School. The tests carried out in this study include a prerequisite test, hypothesis test, and normalized gain (N-Gain) test. The occurrence of increased student interest and learning outcomes using the Learning Cycle 5E learning method can be seen through the N-Gain test.

3.1.1. Normality Test of Learning Interest

Data is considered normally distributed if the significance level is greater than 0.05. The data is considered abnormally distributed if the significance level is less than 0.05. Here are the results of the normality test for learning interest data:

Table 3. The output of the normality test for learning interest

Tests of Normality			
	Shapiro-Wilk		
	Statistic	Df	Sig.
Learning Interest	0,910	20	0,379
a. Lilliefors Significance Correction			

According to Table 3, the Shapiro-Wilk test results indicate a normal distribution of student interest in learning with a significance value of 0.379 > 0.05.

3.1.2. Hypothesis Test of Learning Interest

In the next step of a study, hypothesis testing is required. Assuming that the data follows a normal distribution, we can proceed with the hypothesis testing. For this study, where the data is not independent, the paired t-test is used. The following hypotheses have been proposed, along with the corresponding results:

$H0_1$: There is no significant effect on learning interest using the 5E Learning Cycle model.

Ha_1: Using the 5E learning model significantly influences learning interest.

Table 4. Learning interest t-test output

Paired Samples Test							
Paired Samples Test							
Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		T	Df	Sig. (2-tailed)
			Lower	Upper			
-36,650	14,698	3,287	-43,529	-29,771	-11,151	19	0,000

The results presented in Table 4 indicate that using the 5E learning model significantly impacts learning interest. This is demonstrated by the significance value (two-tailed) of 0.000, which is less than the threshold of 0.05, leading to the rejection of H0 and acceptance of Ha.

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3.1.3. Test N Gain of Learning Interest

The level of student interest in learning can be determined by conducting an N-Gain test, which the SPSS 26 program can assist. Below is a recapitulation table that displays the results of the N-Gain test for learning interest:

Table 5. Recapitulation of n-gain in learning interest

Preliminary Results	The Final Result	N-Gain Score	Category
41,05	77,70	0,61	Medium

Table 5 displays the mean score of students' initial interest before the treatment, which was 41.05. The average score of students' interest after the treatment was 77.70. Furthermore, the average N-Gain value of students' learning interest is 0.61, which indicates that it was in the moderate category.

The results of the recapitulation indicate that fourth-grade students studying science at Singajaya Elementary School, Krangkeng Sub-district, Indramayu Regency, who fall under the moderate category, exhibit a greater interest in learning when the Learning Cycle 5E model is applied.

3.1.4. Normality Test of Learning Outcomes

The output of the normality test of learning outcomes using the help of SPSS 26 in the Shapiro-Wilk column can be seen in the following table:

Table 6. Normality test output of learning outcomes

Tests of Normality			
	Shapiro-Wilk		
	Statistic	Df	Sig.
Learning Outcomes	0,958	20	0,510
b. Lilliefors Significance Correction			

The test indicates that the data on student learning outcomes follows a normal distribution. This is evident from the significance value of 0.510, higher than the test criterion 0.05.

3.1.5. Hypothesis Test of Learning Outcomes

In hypothesis testing, the acceptance or rejection of H0 is based on its significance level. If the significance level is greater than 0.05, H0 is accepted. Conversely, if the significance level is less than or equal to 0.05, H0 is rejected. Below are the proposed hypotheses and their corresponding outcomes:

$H0_2$: There is no significant difference in learning outcomes between the Learning Cycle 5E model and traditional teaching methods.

Ha_2: Using the Learning Cycle 5E model significantly affects learning outcomes.

Table 7. Output of t-test of learning outcomes

Paired Samples Test							
Paired Samples Test							
Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		T	Df	Sig. (2-tailed)
			Lower	Upper			
-29,500	11,344	2,537	-34,809	-24,191	-11,630	19	0,000

Table 7 compares the learning outcomes before and after implementing the Learning Cycle 5E learning model. The significance value (two-tailed) of 0.000 signifies a significance level of 0.05 (5%). The significance value (two-tailed) of <0.05 suggests that the null hypothesis (H0) is rejected, and the alternative hypothesis (Ha) is accepted. Therefore, we can conclude that the application of the Learning Cycle 5E learning model has a significant impact on student learning outcomes.

3.1.6. N Test of Gain in Learning Outcomes

After implementing the Learning Cycle 5E model, the following table represents increased student learning outcomes.

Table 8. Recapitulation of *n-gain* learning outcomes

Preliminary Results	The Final Result	N-Gain Score	Category
38,75	68,25	0,47	Medium

Table 8 indicates that the average value of student learning outcomes before treatment was 38.75; after treatment, it was 68.25. This represents an N-Gain score of 0.47,

which falls into the moderate category. Based on these results, it can be concluded that applying the Learning Cycle 5E learning model effectively improves student learning achievement, particularly in science subjects for class IV at Singajaya Elementary School, Krangkeng District, Indramayu Regency.

3.2. Discussion

Learning is a process by which individuals experience changes in their behavior through engagement with the environment [14]. Learning is a deliberate series of events to influence and support students' internal learning process [15].

A study was conducted on students' learning interests in class IV Singajaya Elementary School before and after receiving the Learning Cycle 5E learning model treatment. The average learning interest value of students before treatment was 41.05. After receiving the Learning Cycle 5E learning model treatment, the final learning interest value increased to an average of 41.05.

These results show that students' interest in learning has increased after applying the Learning Cycle 5E model. The average value of students' interest increased after the treatment compared to before the treatment. This is due to students' increased liking, interest, attention, and involvement in learning [16].

Interest plays a crucial role in student learning, including focus of attention, motivation, and needs. The Learning Cycle 5E learning model positively affects interest, as seen from the students' high interest during learning. Students began expressing their opinions actively and confidently during the learning process.

Interest is crucial in learning as it facilitates concentration, prevents distraction, and strengthens memory [17]. In line with this, Elizabeth Hurlock stated that interest grows as students physically and mentally develop, influenced by individual readiness and existing learning opportunities [18].

According to Ghufrooni et al.'s research conducted at SMAN 61 Jakarta, the Learning Cycle 5E model can effectively increase students' interest in learning, particularly in the engagement and elaboration stages, where students show high levels of participation and enthusiasm [19]. Furthermore, Amalia and Isiqomah's research at SD Negeri Siyono III showed a substantial increase in students' interest in learning. The pre-action score of 49.34% increased to 66.45% in cycle I and 74.34% in cycle II [20].

The research shows that the Learning Cycle 5E model positively impacts student interest in learning. The study found that each stage of the learning process influences student interest, leading to high levels of enthusiasm and activeness. The significance value (2-tailed) of the study was found to be 0.000, indicating that the impact of the Learning Cycle 5E model on student interest in learning is significant. This means that H0 is rejected and Ha is accepted, and it can be concluded that using the Learning Cycle 5E learning model influences student interest in learning. This research is consistent with a study conducted by Susanti et al. involving Class XI SMA Negeri 8 Mataram students, which also found a significant impact of the Learning Cycle 5E model on learning interest. The table t-test value is 2.000, while the calculated t-test value is 3.78 with degrees of freedom (dk) = n1 + n2 - 2 and a significance level of 5%. Therefore, it can be concluded that the

Learning Cycle 5E model positively affects students' interest in learning science in class IV Singajaya Elementary School Krangkeng District, Indramayu Regency [21].

Data analysis was conducted on the learning outcomes of Class IV students at Singajaya Elementary School before any treatment. The average value of learning outcomes was obtained from the students' answers to the pre-test multiple-choice test questions. The average score was 38.75 out of 20 students. After learning using the Learning Cycle 5E model, it was noted that some students who had previously scored the lowest on the pre-test experienced increased scores. The average student answer on the multiple-choice test (mean) reached 68.25 out of 20. Therefore, it can be concluded that students who initially scored the lowest on the pre-test experienced increased scores.

The effect of the Learning Cycle 5E learning model on student learning outcomes in this study proved to be significant. This was characterized by a significance value (2-tailed) of 0.000. This value indicates that the significance level is less than 0.05 (5%). Sig (2-tailed) < 0.05, indicating rejection of H0 (null hypothesis) and acceptance of Ha (alternative hypothesis). As a result, it can be concluded that in Class IV Singajaya Elementary School, Krangkeng District, Indramayu Regency, students' interest in learning science is influenced by using the Learning Cycle 5E learning model.

This study applied the Learning Cycle 5E learning model to focus on how students learn the material, understand the concept, and convey it in their own words. Fuadi et al. also used this model on class XI IPA SMAN 2 Bima students and found that the Learning Cycle 5E learning model produced an average score of 21.90, while the conventional learning model produced an average score of 18.90. This indicates that the Learning Cycle 5E model positively impacts student learning outcomes. Additionally, the Learning Cycle 5E learning model can be used as an alternative to making learning activities more enjoyable and engaging for students rather than using traditional learning models that can make them bored [22].

Based on the data analysis conducted on the learning interests of fourth-grade students at Singajaya Elementary School, it was found that their interest in science subjects was in the moderate category, with an average N-Gain value of 0.61. The N-Gain results suggest that implementing this study's Learning Cycle 5E learning model successfully increased the students' learning interest in class IV Singajaya Elementary School. The moderate category N-Gain value obtained in the study indicates that several factors may have contributed to the outcome, including the students' internal factors. One such factor could be the students' lack of excitement about the subject with the previous learning model, which made some students think that the subject was not enjoyable.

This factor is also supported by research from Murdani et al. at SMPK Maria Fatima Jember, where the results showed that 35.22% of students felt happiness while learning. This indicates that feeling happy can increase students' interest in learning. The sizeable average value of the N-Gain score of learning interest in this study is due to the application of the Learning Cycle 5E learning model, which positively impacted the teaching and learning activities, thus contributing to increased student interest in learning. Moreover, using the Learning Cycle 5E learning model in this study is expected to foster students' enthusiasm and self-confidence, increasing their interest in learning [23].

An analysis of data on student learning outcomes in fourth-grade class IV Singajaya Elementary School found that the average N-Gain score was 0.47, considered moderate. This study concluded that the Learning Cycle 5E learning model could improve students' learning outcomes in this category on the science topic "Plant Parts and Their Functions." However, social relationships among students, like fussing with classmates, could also affect the moderate category N-Gain value on student learning outcomes.

Research conducted by Kurniawan et al. on classes X TPBO and X TSM at State Vocational School 8 Bandung revealed that external factors such as learning methods by 63.9%, learning media by 66.8%, and social environment by 50.5% could also affect student learning outcomes. These results indicate that social factors can significantly impact student learning outcomes [24].

Puluhulawa et al.'s study supports these findings. The learning outcomes of students who used the Learning Cycle model were better than those who used the direct learning model, especially in formal reasoning. A significant interaction between the learning model and formal reasoning on mathematics learning outcomes supported this finding. Learners with a high level of formal reasoning showed better achievement [25].

The results of this study suggest that the Learning Cycle 5E learning model could help solve learning problems, especially in improving learning outcomes. The N-Gain test in this study is inseparable from the five stages of the Learning Cycle 5E learning model, which aims to create a more enjoyable learning environment and make students more confident, active, and creative.

4. CONCLUSION

The results showed that the dependent and independent variables had a significant relationship, namely learning interest and science learning outcomes in class IV UPTD SDN Singajaya, as well as the focus variable, using a learning model based on Learning Cycle 5E. Based on the multiple sample t-test analysis results, the significance value is very low (0.000), less than 0.05. This implies that Ha is accepted and H0 is rejected.

In addition, it can be concluded from the given data that the interest and learning outcomes of grade IV UPTD SDN Singajaya students have increased after applying the Learning Cycle 5E learning model in science subjects. This conclusion is supported by the N-Gain results, which fall in the medium category.

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