

The Influence of the *Learning Cycle* Learning Model on Students' Creative Thinking Skills in Science Learning

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ABSTRACT

The issue of creative thinking skills in elementary school students is very basic because to achieve learning success in science learning at the elementary school level, it is necessary to increase creative thinking skills in elementary school students. The purpose of this study is to determine the development of the *Learning Cycle* learning model to improve the creative thinking ability of elementary school students in science learning. This research is an experimental study, which looks at the causal relationship. There were two groups of classes compared in this study, namely the control class and the experiment. Data collection is quantitative data obtained from *pretest* and *posttest* results in control classes and experiments. Then to see the improvement of students' abilities from the initial test to the final test using normal *Gain* scores. The results of the analysis can be concluded that learning with the *Learning Cycle* model can improve the creative thinking ability of grade IV elementary school students in science learning. In addition, conventional learning can also improve the creative thinking ability of grade IV elementary school students in science learning. However, based on quantitative data collection obtained from *pretest* and *posttest* results in control classes and experiments, there are very significant differences in the increase in creative thinking skills of grade IV elementary school students in science learning.

Keywords: Creative thinking skills, *Learning Cycle*, Science

INTRODUCTION

In Government Regulation no. 19 of 2005 concerning National Education Standards, in Article 19 paragraph 1 it is stated that the learning process in educational units is carried out in an interactive, inspiring, fun, challenging manner, motivates students to participate actively, and provides sufficient space for initiative, creativity and independence in accordance with the talents, interests and physical and psychological development of students.

Based on this description, teachers are required to have commitment, strong will, and the ability to carry out learning in accordance with the provisions mentioned above. Ideally, the learning process is not only directed at Gaining as much knowledge as possible, but also how

to use all the knowledge Gained to solve problems or carry out assignments that are related to the field of study being studied.

Teaching activities are an effort to create an atmosphere that encourages initiative, motivation and responsibility for students to always apply their full potential in developing ideas through lifelong learning activities. These ideas and knowledge will shape thinking skills, attitudes and daily behavior so that students will be competent in the field they are studying.

Natural Science is not just about mastering concepts but also involves how to work, how to think, and how to solve problems. Science learning like this will develop students' creative thinking, where creative thinking is important to develop in students, there are so many benefits from creative thinking that will make life easier to live.

In overcoming the problems that occurred above, the researcher proposed the use of a learning model that is considered capable of improving students' creative thinking skills, namely one learning model that is considered suitable for science learning is the *Learning Cycle* learning model.

One way to increase creative thinking skills is through the *Learning Cycle* learning model which includes the engagement, exploration, explanation, elaboration and evaluation (5E) stages. The 5E *Learning Cycle* learning model was first developed by Robert Karplus [24]. The 5E *Learning Cycle* model consists of several stages or steps that can help improve students' creative thinking abilities.

Based on the description above, this research was carried out with the title "The Influence of the *Learning Cycle* Learning Model on Students' Creative Thinking Skills in Science Learning" at SDN 1 Sijuk, Sijuk District, Belitung Regency.

RESEARCH METHODS

This research was conducted to see the effect of the *Learning Cycle* learning model on the creative thinking skills of fourth grade elementary school students in science learning. Based on its characteristics, this research is included in quasi-experimental research, namely looking at cause-and-effect relationships. Experimental research as "a research method used to find the effect of certain treatments on others under controlled conditions". The aim of the experimental method is to determine the effect or cause-and-effect relationship by comparing the results of the experimental group that was given treatment with the control group that was not given treatment.

There were two class groups compared in this research, namely the control class and the experimental class. The first thing to do was to randomly determine two schools that would be used as research sites. The schools selected are schools that are within the core schools based on the decision of the Sijuk District KKKS, Belitung Regency. After selecting the school, it is necessary to determine the class that will be used as the research site, namely the control class and the experimental class. Both classes were given a *pretest* to measure students' initial abilities. Furthermore, during the research, the control class was given science learning using the conventional learning model, while the experimental class was given learning using the

Learning Cycle learning model. At the final stage, a *posttest* is given to see the differences in students' creative thinking abilities in the two classes after being given different treatment.

The design used in this research was a *pretest-posttest control group design*. In this research design, two classes were used, namely one class as the experimental class and another class as the control class. In the control class, no special treatment was given, only using conventional learning, while in the experimental class, special treatment was given, namely learning using the *Learning Cycle* learning model. Both groups were given a *pretest* and *posttest* with the same questions.

RESULT AND DISSCUSION

Research Result

Hypothesis 1 There is an increase in students' creative thinking skills by using the *Learning Cycle* learning model in science learning.

Based on the normality test data that was carried out in the experimental class, it was found that the *pretest* data was normally distributed and the *posttest* data was normally distributed, then the next step was to carry out a mean difference test or t-test. Meanwhile, data analysis was carried out with the help of *SPSS 23 for Windows software*, which can be seen in Table 1 below.

Table 1: Hypothesis Test Results Problem Formulation

Paired Samples Correlations

	N	Correlatio	Sig.
Pair 1 PRETEST & POSTEST	30	.708	.000

Based on the data in Table 4.1, it is found that the sig (*2-tailed*) value is 0.000. Because the hypothesis proposed is one-way, the sig (*2-tailed*) is divided by two, namely $0.000/2$ to become a sig (*1-tailed*) of 0.000. The data shows that the sig value is smaller than 0.05, which means that H_0 is rejected and H_1 is accepted. This shows that the *posttest* score is better than the *pretest* on students' creative thinking abilities using the *Learning Cycle* learning model. So there is an increase in students' creative thinking abilities using the *Learning Cycle* learning model. The increase can be seen from the average *pretest* score, which is 41.46, while the *posttest* score is 75.42, so we get a difference of 33.96. Based on the results above, the data can be concluded that hypothesis 1 is accepted, which means that using the *Learning Cycle* learning model can improve students' creative thinking abilities.

Hypothesis 2 There is an increase in students' creative thinking skills by using conventional learning models in science learning. Based on the normality test data that was carried out in the control class, it was found that the *pretest* and *posttest* data were normally distributed, then the next step was to carry out an independent t-hypothesis test because both data were normally distributed. Meanwhile, data analysis was carried out with the help of *SPSS 23 for Windows software*, which can be seen in Table 2 below.

Table 2: Hypothesis Test Results Problem Formulation 2
Paired Samples Correlations

	N	Correlation	Sig.
Pair 1 PRETEST & POSTEST	30	.825	.000

Based on Table 2, it is found that the sig (*2-tailed*) value is 0.000, which indicates the sig value is smaller than 0.05. However, in this hypothesis test it is only one way, so the *P-value* (sig) is divided into 0.000. So, the *1-tailed P-value* (sig) is less than 0.05, which means that H_0 is rejected and H_1 is accepted. This shows that the *posttest* score is better than the *pretest* for students' creative thinking skills using conventional learning models. So, using conventional models can improve creative thinking skills. The increase can be seen from the average *pretest* score, which is 15.42, while the *posttest* score is 61.5, so a difference of 46.39 is obtained. Based on the results above, it can be concluded that hypothesis 2 is accepted, which means that using conventional learning methods can improve students' creative thinking skills.

Hypothesis 3 There is a difference in improving students' creative thinking skills between learning using the *Learning Cycle* learning model and conventional learning models on environmental change material.

Based on testing hypothesis 1 and testing hypothesis 2, it can be seen that learning using the *Learning Cycle* and conventional learning models can both provide an increase in students' creative thinking skills. However, between these learning models, which one improves students' creative thinking skills more. Therefore, a hypothesis test was carried out to answer problem formulation 3.

Of the 30 students in the control class who took the *pretest* and *posttest*, there were 18 students who experienced low improvement, 11 students experienced moderate improvement, and 1 student did not experience improvement. From the explanation above, it can be concluded that learning using the *Learning Cycle* learning model is better than learning using the conventional learning model. This can be seen from the number of students in the experimental class which experienced a very high increase, namely from 30 students there were 5 students. Meanwhile, in the control class which used the conventional learning model, students did not experience such a good improvement in creative thinking skills. Where most students experience a low increase and do not even experience a steady increase.

Based on the *Gain* data for the two classes, the lowest, highest, average value and standard deviation or *Std. Deviation* in Table 3 is as follows.

Table 3: Descriptive Statistics on the *Gain* Value of Creative Thinking Skills for Experiment Class and Control Class Students

Descriptive Statistics						
	N	Minimum	Maximum	Sum	Mean	Std. Deviation
EKPERIMEN	30	.23	1.00	17.72	.5905	.20991
KONTROL	30	.00	.63	9.33	.3110	.15610

Valid N (listwise)	30					
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To see the increase in creative thinking skills of students in the experimental class and control class, a normality test and a test of the difference in average *Gain* obtained by the two classes were carried out. The following are the results of the *Gain* testing for the experimental class and control class in table 3.

The Normality Test for the *Gain* Values of the Experimental Class and Control Class of students' Creative Thinking Skills was carried out to determine whether the *pretest* and *posttest* score data in the experimental class and control class were normally distributed or not. Therefore, to find out whether the results are identified as normal or abnormal, the *Lilifors test (kolmogrof-smirnov)* will be carried out.

Table 4: Test of Normality of *Gain* in Creative Thinking Skills of Experiment Class and Control Class Students

Faktor		Kolmogorov-Smirnov ^a		
		Statistic	df	Sig.
Gain	Gain Eksperimen	.096	30	.200*
	Gain Kontrol	.169	30	.028

Based on Table 4, it can be seen that the normality test results for the *Gain* value for the experimental class have a significance value of 0.200. Thus, the normality test results for the *Gain* of the experimental class are greater than $\alpha=0.05$, meaning that H_0 is accepted, which means that the *Gain* value from the experimental class is normally distributed.

Meanwhile, the normality test results for the control class *Gain* value have a significance value of 0.028. Thus, the control class *Gain* normality test results are smaller than $\alpha=0.05$, meaning H_0 is rejected, which means the control class *Gain* value is not normally distributed.

The Test for the Difference in Average *Gain* Values for the Experimental Class and Control Class for Creative Thinking Skills was carried out because in the normality test of the *Gain* values, data was obtained that were not normally distributed, so the next step was to directly test the average difference using the U-test or the *Mann Whitney test*.

The significance level requirement used in this research is 5% ($\alpha = 0.05$) based on the *P-value*. If the *P-value* is 0.05, it means that H_0 is rejected, whereas if the *P-value* ≥ 0.05 means that H_0 is accepted. The following is the data from the calculation of the difference in average *Gain* values in the two classes using the *Mann Whitney test*.

Table 5: Test of Difference in Average *Gain* Values for Experiment Class and Control Class Test Statistics^a
Test Statistics^a

	Gain
Mann-Whitney U	118.50
Wilcoxon W	583.50
Z	-4.90
Asymp. Sig. (2-tailed)	.00

Based on the data above, a test of the difference between the average *Gain* values of the experimental class and the control class was calculated using the *Mann Whitney test*, with a significance level of $\alpha = 0.05$, a significance value (*2-tailed*) was obtained, namely 0.000, which indicates a significance value smaller than 0.05. However, in testing hypothesis 3, only one direction is used, so the significance value of 0.000 is divided by two, namely $0.000/2$ becomes 0.000. So, we get a significance value (*1-tailed*) of 0.000 which means less than 0.05 so that H_0 is rejected. Thus, H_1 is accepted, which means that there is a difference in increasing students' creative thinking skills between learning using the *Learning Cycle* learning model and conventional learning models in science learning. Using the *Learning Cycle* learning model improves better than using conventional learning methods. The average *posttest* score for the experimental class was 75.42, while the *posttest* score for the control class was 61.81, so a difference of 13.61 was obtained.

DISCUSSION

Increasing the Creative Thinking Ability of Experimental Class Students in Science Learning

Learning using the *Learning Cycle* model was carried out in the experimental class at SDN 19 Sijuk in two meetings with a time allocation of 2x35 minutes per face-to-face meeting. The number of students in the experimental group was 30 people. Based on the results of the *pretest* on creative thinking abilities in the experimental class, the average *pretest* score was 41.46. For more details, the learning that has been carried out will be described as follows.

The teacher's initial learning activities condition students to be ready to carry out learning, then the teacher and students carry out prayer activities. Before starting the activity of providing learning material, the teacher first provides apperception by asking students questions about material regarding environmental changes by asking questions relating to students' daily lives so that students feel interested in the learning that will be provided.

In the core activities, the teacher carries out learning activities with students as the main actors in learning. The teacher only acts as a facilitator in charge of directing the learning process so that the learning process can take place in a conducive manner by providing opportunities for students to discover concepts in learning. During the learning process in this research, students were given worksheets based on groups as a guide to be able to find and search for material

that students wanted to know, as well as being able to make observations in experiments, interpret the results of observations in experiments, group them. Apart from that, students were given media as a tool to help students to prove the discoveries that students have made when searching for data or when discovering a concept regarding environmental change. The learning process is carried out regularly, learning carried out in the experimental class is carried out according to the stages or phases in the chosen model, namely the *Learning Cycle* model.

In the final activity, the teacher carries out a question-and-answer activity to strengthen the material they have received as a form of reflection. In this activity, students are reminded of the things they have learned so they can understand the material regarding environmental change. So that students can understand the learning and material that has been provided.

After all the learning is done, students then do the *posttest*. The *posttest* given is the same questions as the questions given during the *pretest*. The average score of students' creative thinking skills obtained by the experimental class during the *posttest* was 75.42. The creative thinking skills of the experimental class who took part in learning using the *Learning Cycle* model experienced an increase. This can be seen from the average score of the *pretest* and *posttest* of the experimental class which has increased from the initial score of students' creative thinking skills, namely 41.46 after treatment using the *Learning Cycle* learning model, then a final test for skills was carried out. creative thinking obtained a value of 75.42. Based on the normality test data that was carried out in the experimental class, it was found that the *pretest* data was normally distributed and the *posttest* data was normally distributed, then the next step was to carry out a mean difference test or t-test. It can be seen from the t-test results presented in hypothesis 1 testing that the sig (2-tailed) value is 0.000. The data shows that the sig value is smaller than 0.05, which means that H_0 is rejected and H_1 is accepted. This shows that the *posttest* score is better than the *pretest* on students' creative thinking abilities using the *Learning Cycle* learning model. So, there is an increase in students' creative thinking abilities using the *Learning Cycle* learning model.

Improving the Creative Thinking Skills of Control Class Students in Science Learning

After conducting research in the control class, namely at SDN 18 Sijuk, *pretest* data on students' creative thinking skills were obtained using conventional learning models in the control class. The average *pretest* score for creative thinking skills from 30 students was 46.39. Based on this, the control class will be treated using conventional learning methods.

Students in the control class were given treatment using conventional learning models. The conventional learning used is in the form of lectures, questions and answers, and discussions in 2 meetings with a time allocation of 2x35 minutes for each meeting. For more details, the learning that has been carried out will be described as follows.

The initial activities were not much different from the activities in the experimental class, namely conditioning the students to be ready to learn, then the teacher and students carried out prayer activities. Next, the teacher conducts an apperception regarding environmental change material to stimulate students' initial knowledge.

In the core activity the teacher explains environmental change material using the help of learning media. The media used are images of natural events related to environmental change, in the form of images of landslides, floods, erosion and abrasion. Providing direct experience is what [20] means concrete learning, whether learning that provides direct experience in the natural surroundings, or learning that uses media as a means of conveying information. The media used is very helpful when providing material or concepts to students. When learning uses conventional learning using concrete media, the teacher can easily convey the material well so that the material on environmental changes will be conveyed. In the learning process, to overcome boredom, the teacher carries out question and answer activities and every student who is able to answer with the right answer will be accumulated at the end of the lesson and given a prize. After the material is delivered, students will be given worksheet for each group. The worksheet is given with the aim of practicing students' abilities after being given the material. Then students are given the opportunity to ask questions about the worksheets that have been given. After completing the worksheet, the teacher discusses it a *Gain* as an effort to straighten out the concept and provide material reinforcement.

At the final activity, the teacher provides the opportunity to conduct questions and answers regarding the material that has been studied. Next, the teacher and students conclude the lesson.

After all the learning is done, students then do the *posttest*. The *posttest* given is the same questions as the questions given during the *pretest*. The average score obtained for the creative thinking skills of control class students during the *posttest* was 61.81. The creative thinking skills of the control class who took part in learning using conventional learning models experienced an increase. This can be seen from the average *pretest* and *posttest* scores of the control class which have increased from the initial score of students' creative thinking skills, namely 46.39. After the treatment was carried out using conventional learning models, a final test was carried out for the creative thinking skills test, obtaining a score of 61.81. Based on the normality test data that was carried out in the control class, it was found that the *pretest* and *posttest* data were normally distributed, then for the next step, namely. It can be seen from the independent t-hypothesis test that the sig (2-tailed) value is 0.000, which indicates the sig value is smaller than 0.05. However, in this hypothesis test it is only one way, so the *p-value* (sig) is divided into 0.000. So that the 1-tailed *p-value* (sig) is less than 0.05 which means that H_0 is rejected and H_1 is accepted. This shows that the *posttest* score is better than the *pretest* for students' creative thinking skills using conventional learning models. So, using conventional models can improve creative thinking skills.

Teachers in the course of learning are very important. Teachers must create a pleasant classroom atmosphere so that the material presented can be well received by students. Conventional learning is proven to be able to improve students' creative thinking skills if the teacher's performance is optimal in delivering the material.

Differences in Increasing Creative Thinking Skills for Experiment Class and Control Class Students in Science Learning

It is known that both learning methods using the *Learning Cycle* model and conventional learning models can improve students' creative thinking skills, however, there are differences in improving creative thinking skills between the control class and the experimental class. In

order to find out the difference in improving creative thinking skills in the experimental class and the control class, a *pretest* and *posttest* average test was carried out for the experimental class and the control class.

Based on the calculations that have been carried out, the data from H_0 H_0 *pretest* calculations were identified as having an acceptable average, which means that there is no difference in the average initial ability of students' creative thinking skills between the experimental class and the control class. Next, an average test was carried out on the *posttest* results of the experimental class and control class.

Based on the test results, the average identified as having an average of H_1 H_1 is accepted, which means that there is a difference in the average creative thinking skills of students in the experimental class and the control class.

It is known that the *pretest* data with H_0 H_0 and *posttest* with H_1 H_1 are accepted. A *U-test* or *Mann-Whitney Test* will be carried out, the aim is to find out which class improves students' creative thinking skills more. As for the results of the calculation of the difference between the average *Gain* values for the experimental class and the control class using the *Mann Whitney test*, the significance level $\alpha = 0.05$ obtained a significance value (*2-tailed*) of 0.000, which indicates a significance value smaller than 0.05. However, in this test only one direction is used, so the significance value of 0.000 is divided by two, namely $0.000/2$ becomes 0.000. So, we get a significance value (*1-tailed*) of 0.000, which means less than 0.05, so it is rejected.

Thus, H_1 H_1 is accepted, which means that there is a difference in increasing students' creative thinking skills between learning using the *Learning Cycle* learning model and conventional learning models on environmental change material. Using the *Learning Cycle* learning model improves better than using conventional learning methods. The average *posttest* score for the experimental class was 75.42, while the *posttest* score for the control class was 61.81, so a difference of 13.61 was obtained.

The differences in the results of creative thinking skills were due to the different treatments given to the experimental class and control class. Based on the test results, it can be seen that the *Learning Cycle* learning model further improves creative thinking skills.

So that learning will be meaningful and can train students' creative thinking skills. By carrying out activities such as searching for and solving problems and then finding the solution, it is training creative thinking skills.

CONCLUSION

Based on the results of research and data analysis, several conclusions can be drawn as follows:

- 1) Based on the *posttest* score, it is better than the *pretest* score on students' creative thinking abilities using the *Learning Cycle* learning model. So, there is an increase in students' creative thinking abilities using the *Learning Cycle* learning model.
- 2) Based on the *posttest* score, it is better than the *pretest* score for students' creative thinking skills using conventional learning models. So, using conventional models can improve creative thinking skills.

- 3) Based on comparative data from pretest results and posttest results, it can be concluded that learning using the *Learning Cycle* learning model is better than learning using conventional learning models. This can be seen from the number of students in the experimental class which experienced a very high increase, namely from 30 students there were 5 students. Meanwhile, in the control class which used the conventional learning model, students did not experience such a good improvement in creative thinking skills. Where most students experience low improvement and do not even experience improvement or remain constant.

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