JISE 12 (2) (2023): 173-179

Journal of Innovative Science Education

http://journal.unnes.ac.id/sju/index.php/jise

Student Learning Outcomes on Ecology and Biodiversity with the Construcvism Approach Learning Discovery Models

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Article Info

Article History :
February 2023
Accepted
April 2023
Published
August 2023

Keywords:
constructivism, discovery learning, learning outcomes.

Abstract

The research aims to analyze student learning outcomes, analyze student activities, analyze student responses and analyze teacher responses with a constructivist approach to discovery learning models. The form of research is pre experimental design, pre test-post test control group design. The population in this study were all junior high students of class VII even semester of SMP N 1 Brangsong, while the research sample was class VIIA and VIIB. Learning outcomes were analyzed using the t-test, while student activities, student responses and teacher responses were analyzed descriptively. The results showed that the gainscore of the experimental class was 31.54 while that of the control class was 25.92, while the significant value of the T-test was 0.000, the activity of the experimental class students was 93.6%, the student response was 89.69% positive while 10.31% was negative and the teacher's response was 85. 7% strongly agree. The conclusion of this study is that the results of student learning on ecology and biodiversity with a constructivist approach to the discovery learning model are better than the control class, the material for ecology and biodiversity with a constructivism approach, the discovery learning model makes students more active, students' responses Ecology and biodiversity material using a constructivist approach to the discovery learning model is positive and the teacher's response to the material on ecology and biodiversity using a constructivist approach to discovery learning model is positive, so it is very agreeable to be applied.

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p-ISSN 2252-6412
e-ISSN 2502-4523

INTRODUCTION

Teaching and learning activities should be student-centered. Students will learn well if they are well supported if they are supported by adequate learning support, learning models are interesting if they involve students actively (Kristin, 2016). Students develop problem-solving skills, develop creativity, develop knowledge and work together. Student learning interest during the learning process can influence understanding and learning outcomes (Huang, 2016).

Factors that can cause low learning include not taking advantage of the surrounding environment and involving students actively. This condition is supported by teachers who dominate learning activities. According to (Widodo, 2019) Teachers have not optimized the natural environment as a learning resource to improve learning outcomes in science learning. Learning by utilizing the environment or outside the classroom will complement the deficiencies in the learning process that cannot be obtained from within the classroom (Widoretno, 2019). The curriculum used now emphasizes that students play an active role that involves students directly (Salwan, 2017). Teachers can utilize media, learning resources and models that can be adapted to material for more effective learning (Nurhidayati, 2022).

Learning resources in teaching are everything (for example: the environment) that can be used and can support learning activities so that they are more effective and make it easier to achieve learning objectives. Teachers can utilize the school environment as a learning resource to make it easier for students to understand the material (Irwandi, 2019). Learning by utilizing the environment around the school can use a constructivism approach to discovery learning learning models.

The constructivism approach is a way for educators to position themselves as facilitators, as well as guiding students in exploring their own knowledge, obtaining their own scientific concepts obtained through learning experiences (Yuliani, 2021). Constructivism learning theory concerns how students gain knowledge in interactions, teachers play an important role in directing students during the learning process (Kibirige, 2021).

The Discovery Learning learning model is a learning model that encourages students to be active, understand concepts, meanings, and relationships through an intuitive process to reflect on a teaching and learning activity (In'am A & Hajar S, 2017). The discovery learning model will make learning centered on students, so learning in class will make students more active (Yuliani, 2021).

Ecology and Biodiversity material is material that discusses the interaction between the environment and living things and biodiversity in Indonesia. The interaction of living things with the environment can be studied directly. Students can study abiotic and biotic components by observing the environment around the school. Students can also observe interactions between biotic and abiotic components in the ecosystems that form in the environment around the school. If the material is delivered orally without active student involvement, it will make students less interested. Students will understand the material more if they are directly involved.

The results of interviews with junior high school teachers at SMPN 1 Brangsong show that the teaching and learning process is quite good. However, learning activities are more often carried out in the classroom and only refer to the theory in the book. The method used is also always the same in each subject matter, one of which is the lecture method so that learning seems monotonous and does not involve students actively. Learning outcomes that are not optimal are suspected because students' interest in learning is still low, especially in studying the material on Ecology and Biodiversity.

METHODS

This research uses the form of Pre Experimental Design, Pre Test-Post Test Control Group Design. The population in this study were all junior high students of class VII even semester of SMP N 1 Brangsong, totaling 283 students, with class VIIA as the control class and class VIIB as the control class. The number of students in each class is 32 students. Sampling was carried out using cluster random sampling technique, namely taking two classes at random from the existing population. Data obtained by the method of observation, testing and documentation. In the experimental class, students were treated using a constructivist approach to the discovery learning model. In the early stages the teacher will provoke questions or

problems (stimulation), so students will be encouraged to identify (problem statements), in groups students will observe and collect data from the environment around the school (data processing), from the data obtained students will discuss it with their friends (data processing), from the results of student discussions match the existing theory (verification), and then students accompanied by the teacher draw conclusions from the results of the discussion ((generalization). Meanwhile for the control class students use the lecture method in the learning process.

Data on student learning outcomes were obtained from pre-test and post-test evaluation scores for the experimental class and control class, student activity data were obtained from observation sheets, student response data regarding the learning process were obtained from questionnaires/questionnaires, teacher response data to the learning process were obtained from questionnaires/questions . Student learning outcomes were analyzed using the t test. Student activities were analyzed descriptively. Analysis of student responses was carried out by calculating the presentation of student responses and described descriptively. Analysis of responses to learning about ecology and biodiversity using a constructivist approach to the discovery learning model was analyzed descriptively.

RESULTS AND DISCUSSION

The results of the research include student learning outcomes, student activities, student responses and teacher responses. Student learning outcomes were obtained from the analysis of pretest and post-test scores, student activity was obtained from assessments through observation sheets of student activity, student responses were obtained from questionnaires given to students and teacher responses were obtained from questionnaires given to teachers. The data obtained were then analyzed and used to answer the research hypothesis.

To find out the differences in student learning outcomes in the experimental class and the control class, several data analyzes were carried out, including normality tests, homogeneity tests, N-gain tests and T-tests. About 40 pretest and post test questions were tested on 32 students in the experimental class and 32 students in the control class.

Table 1. The learning outcomes of the experimental class and the control class

Criteria	Experiment Class	Control Class
Pre-test average	54.43	55.08
Post-test average	86.08	80.45
The lowest value pre test	40	42
	62.5	62.5
The highest score pre test	75	70
	95	87.5
The lowest score post test		
The highest post test score		

The normality distribution test is used to assess the distribution of data in a group of data or variables normally distributed or not. The normality test is used as a requirement for the use of parametric statistics, such as t tests, ANOVA, regression analysis, correlation analysis and others. The technique used in SPSS is the Kolmogorov Smirnov Test (sample>100) or the Shapiro Wilk Test (sample<100).

Table 2. Results of the normality test for the experimental class and the control class

Criteria	Experiment Class	Control Class
Significant	0.093	0.720

From the results of the analysis of significant data from the experimental class of 0.093 and the significance of the control class of 0.720. The significant value of the experimental class and control class is > α 0.05, so the hypothesis is accepted. Analysis of the normality of student learning outcomes is normally distributed. Homogeneity test is used to find out the data groups are not different or the same or homogeneous.

The results of data analysis showed a significant value of 0.548. Because the significant value is > α 0.05 so that homogeneous data is obtained (not different). The effectiveness of learning can be obtained from the analysis of learning outcomes. Based on the analysis of the experimental class and the control class using the t-test, the following results were obtained. The

hypothesis is rejected if the Significance value ≥ α 0.05. Based on the output of the t test, a significance value of 0.000 is obtained. Because the significance value is 0.000, which means it is smaller than α 0.05, thus Ha is accepted and Ho is rejected.

Ha: The Discovery Learning Model Constructivism Approach has a significant effect on student learning outcomes, declared accepted.

Ho The Constructivism Approach of the Discovery Learning Model does not have a significant effect on student learning outcomes, otherwise it is rejected.

Based on descriptive analysis, the average gain score of students in the experimental group = 31.4063 and in the control group = 25.9219. So that the learning outcomes of experimental class students are higher than the control class. Thus it can be concluded that the constructivist approach to the Discovery learning model has a significant effect on student learning outcomes.

Results of Student Activity Data Analysis

Student activity data was obtained from assessing student activity at each meeting according to the aspects studied. Following are the results of the analysis of the data obtained during the 3 meetings:

Table 3. Analysis of student activity

Meeting	Average Score	%
1	37.3	93
2	37.6	94
3	37.5	94
Average	37.44	93.6

Table 4. Student Activity Criteria

Activity (%)	Criteria
86-100	Very good
76-85	Good
60-75	Enough
55-59	Not enough
<=54	Less Once

(Purwanto, 2016)

Based on data analysis, the average percentage of student activity is 93.5%. So it can be concluded that the activity criteria during the learning activities take place is very good.

Table 5. The results of the analysis of student responses are as follows

Aspect	Positive (Yes)	Negative (No)
1	29	3
2	27	5
3	25	7
4	27	5
5	30	2
6	30	2
7	31	1
8	29	3
9	31	1
10	28	4
Average	28.7	3.3
Percentage	89.69%	10.31%

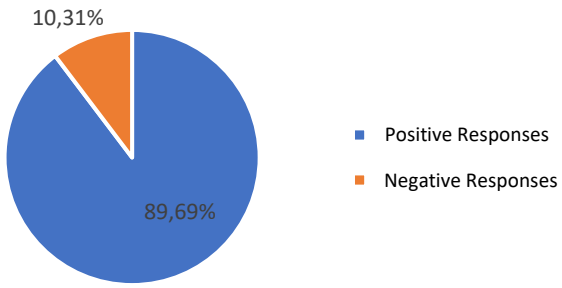

Figure 1. Student response

Based on the analysis of student responses, 89.69% responded positively and 10.31% responded negatively. So it can be concluded that the overall student response was positive.

Table 6. Teacher Response Analysis

Aspect	SS	S	TS	STS
1	1			
2	1			
3	1			
4	1			
5	1			
6	1			
7	1			
Total	6	1	0	0
Percentage	85.7%	14.3%	0%	0%

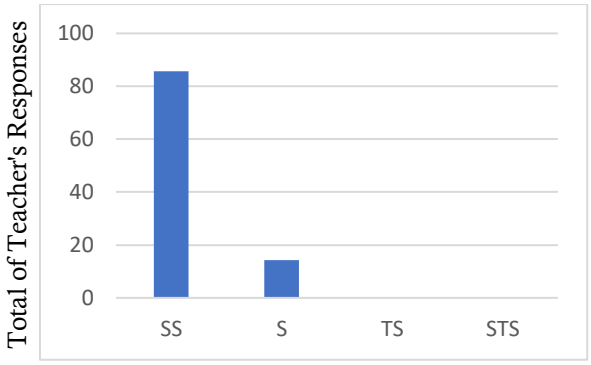

Figure 2. Teacher Responses

The results of the analysis of the teacher's response to the learning aspects, as much as 85.7% of the teacher's responses strongly agreed.

Based on the analysis of pretest and posttest data in the experimental class and control class, the average gain score of students in the experimental group = 31.40 and in the control group = 25.92. There is a significant difference in the gainscore in the control class and the experimental class. So it can be concluded that the learning outcomes of the experimental class using the constructivism approach of the Discovery learning model are better than the control class.

The factor that makes the experimental class have better learning outcomes than the control class is because the experimental class uses a constructivist approach to the discovery learning model. Students are directly involved in active learning by utilizing learning resources around the school environment (Fitriani, 2016). In addition, the teacher also asks students to take advantage of various learning resources to attract student learning interest. According to Steward (2023) students will be more interested if they are directly involved in discovering learning concepts.

Discovery Learning directs students by making observations, solving problems and providing broad opportunities for students to develop their potential (Hariyanto, 2023). In applying the discovery learning model it not only requires students to be more active in learning but also makes students develop abilities such as observation, analysis, prediction and determination (Irawan, 2019). The interactions that occur through discovery learning will make students more focused. Students will solve problems and discuss until they come to a conclusion.

Data on student learning activities were obtained from observations during the learning process. The teacher will assess student activity during three meetings which then analyze the average percentage. At the first meeting the average student activity was 93%, while the second meeting was 94% and the third meeting was 94%. The overall average student activity during the three meetings was 93.6%. Based on the criteria of student activity, it can be stated that student activity is very good when learning takes place.

Student activity in the learning process is an important thing that teachers can develop, such as finding concepts and drawing conclusions (Sihotang, 2020). Student learning activities during the learning process will affect learning outcomes (Wang, 2022). The constructionist approach to the discovery learning model makes students more active during learning. During the material on ecology and biodiversity, students were directed by the teacher to utilize learning resources from both the environment around the school, books and the internet. The teacher directs students to observe the biotic and abiotic components that exist in the school environment. Students observe components in the school environment and also the interactions that occur. Students in groups discuss the LKPD given. The teacher guides students in drawing conclusions based on the results of the discussion. Student interaction in discussing and interacting with groups will affect learning outcomes (Lim, 2023).

Student responses are important for teachers as feedback from students to teachers to help improve the quality of the educational process and determine the level of interest in the learning process that has been carried out (Vydrova, 2012). Student responses were obtained from questionnaires given to experimental class students, namely class VIIA. Students were asked to fill out a questionnaire consisting of ten aspects. There are two assessment criteria, namely yes and no. If the student answers yes, it means that the student responds positively and if the student answers no, the student's response is said to be negative. The results of the average student response, there were 89.69% responding positively and 10.31% responding negatively. So that the overall student response was positive. Students will respond positively if they are directly involved in the learning process (Crisp, 2016).

The teacher's response was obtained from a questionnaire given to science teachers in class VIIA and VIIB. Based on the data analysis that has been carried out, 85.7% of the teacher's responses stated that they strongly agreed, 14.3% agreed, 0% disagreed, and 0% strongly disagreed.

Aspects with strongly agree criteria are that the learning objectives are conveyed well; learning material delivered coherently, clearly and easily understood; the approaches and models used to attract students' learning interest; learning media that are made to attract students' attention; LKPD made to make students actively involved; and evaluations are made in accordance with the material being taught. While aspects with agreed criteria are images used in relevant learning media. Based on these aspects of data, it can be stated that the teacher strongly agrees that learning about ecology and biodiversity uses a constructivist approach to the discovery learning model.

CONCLUSION

Based on the research that has been done, it can be concluded that: The results of student learning on ecology and biodiversity with a constructivist approach to the discovery learning model are better than the control class. Ecology and biodiversity material with a constructivist approach to the discovery learning model makes students more active. Student responses to ecological and biodiversity material with a constructivist approach to positive discovery learning models. The teacher's response to the material on ecology and biodiversity with a constructivist approach to the discovery learning model is very agreeable.

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