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Constructivism Approach in Science Learning

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Abstract: The aims of this study were to determine the effect of the constructivist approach to science learning of material human respiration. This study uses the Classroom Research method with stages: planning, implementation, observation, and reflection. The Subjects of the Research were fifth grade students of elementary school Inpres 4/82 Walian. Data collection in the study used 2 assessments, namely observation and the assessment sheet. The progress and improvement obtained during the two-cycle learning process shows that through the implementation constructivism approaches in science subject can improve learning outcomes. This study concluded was the constructivism learning approach had a positive influence on science learning.

Keywords: constructivism approach, science learning

I. INTRODUCTION

The application of the 2013 curriculum is a character-based education that demands the personal development of each student. The activity of students in the process of science learning can help them to construct their knowledge [1] [2]. science Learning of material for human respiration is a material that is difficult to explain if only using the direct method or using concrete learning media in the form of images.

The purpose of implementing the 2013 curriculum is to provide an enjoyable experience for each student but in its application existing learning outcomes have not met the objectives of the 2013 curriculum implementation. Observations found that learning in class V SD Inpres 4/82 Walian found a learning process that had not able to provide optimal learning outcomes. Based on discussions with the teacher, found factors that cause students to obtain grades under the minimal completeness criteria for human respiratory material.

The reason is that students lack concentration in following learning, are less active, lack attention to teacher explanations, play alone, sometimes feel bored. Factors in general that lead to low learning outcomes in science subjects are currently there are still many teachers who use traditional approaches to science learning so students have not been directed to understand the science concepts that are being studied.

So as to improve science learning outcomes in human respiratory material in class V elementary school Inpres 4/82 Walian, researchers applied the constructivism learning approach. Constructivism learning approach is an approach to learning that believes that people actively build or make their own knowledge by the experience of the person himself [3]. One reason for the broad, intuitive appeal that has fueled the growth of constructivism as an epistemological commitment and instructional model may be that it includes aspects of Piagetian, Ausubelian and Vygotskian learning theories; namely, the importance of ascertaining prior knowledge, or existing cognitive frameworks, as well as the use of dissonant events (relevant information) to drive conceptual change [4].

Based on the background described earlier, the problems that exist in this research are "How can constructivism approaches improve the learning outcomes of science learning in human respiratory material. The aims of this study were to determine the effect of the constructivist approach to science learning of material human respiration.

II. METHOD

This study uses the Classroom Research (CAR) method adopted from Kemmis and McTaggart with stages: Planning, Implementation, Observation, and Reflection [5]. In the research planning stage, the activities carried out are visiting the school to submit research permit applications, and compile the learning devices to be used. At the implementation stage learning is carried out by applying a constructivism approach.

Observation activities are carried out when learning activities are in progress by recording important things, for example what the teacher does and what responses the students give, the atmosphere in the teaching and learning process and the results obtained by students. This is done with the help of the classroom teacher to observe the researcher in teaching.

After the implementation of learning activities, reflection involving observers (class teachers) are held to discuss the results of observations and determine the success of the study. the research success criteria are 75% of students complete. if the learning results in cycle 1 have not fulfilled, then the research is continued in the second cycle, taking into account the results of discussion of researchers and teachers as observers about the shortcomings that occur which are factors of cycle failure 1. The Subjects of the Classroom Action Research were fifth grade students of elementary school Inpres 4/82 Walian.

The total number of students in class V is 21 students, consisting of 16 male students and 5 female students. Data collection in the study used 2 assessments, namely observation and the assessment sheet. Data collection techniques are carried out through an observation sheet with 2 assessments that are used by class teachers to observe students who are studying and researchers who are teaching. Then to determine student learning outcomes can be calculated using the formula:

$$\text{CL} = \frac{T}{Tt} x\ 100\ \%$$

Note:
CL : Complete Learning
T : Number of scores obtained
Tt : Total score

III. RESULTS

Classroom action research was conducted in the fifth grade of elementary school Inpres 4/82 Walian with a total of 21 students divided into 16 male students and 5 female students. The class action is carried out in 2 cycles, the first cycle is held on Monday 27 May 2019 and the second cycle is held on Friday 31 May 2019. Cycle II is an improvement from the first cycle and the implementation of each cycle uses a time of 4x35 minutes. In the first cycle meeting the number of student's present was only 20 people, while in the second cycle meeting all students attended, namely 21 people.

A. Cycle *1 Plan Stage*

The research begins with pre-research through observation in the implementation of the learning process in class V to get an initial picture in the process of learning science. The implementation of class actions is carried out with the following stages: In the learning planning stage, it is planned that one meeting held for 4x35 minutes with material human respiration and an indicator to be achieved in learning is to show the human organs, their functions and underline important words in the reading of human respiratory organs.

The things that are done in action planning are preparing a research permit as an introduction at elementary school Inpres 4/82 Walian, preparing a Learning Implementation Plan in with the constructivism approach, preparing the material, preparing teaching aids that be used during learning, preparing the observation students sheets, preparing observation researchers sheets, and preparing assessment sheets that will be used during reflection.

B. Cycle *1 Implementation Stage*

The implementation of the action is carried out in accordance with the plan of learning. learning activities are carried out in accordance with the constructivism approach. Learning activities are divided into several stages.

Initial activities

In the initial activity, the teacher greets students and students answer greetings from the teacher. Then the teacher asks one of the students to lead the prayer in front of the class, and is followed by checking the attendance of the students. after that the teacher conditions a good learning situation by tidying up the tables, chairs, conveying the learning objectives and ensuring students to be ready to learn, and convey apperception. The teacher given the question "what is a respirator in humans" students answer is vary, some answer the nose and throat.

Core activities

The teacher gives questions about what the nose and throat and lungs function. students are asked to write the answer on the student worksheet provided. teacher asks "what is felt in a room full of smoke" and students are asked to make hypotheses or provisional guesses based on the experience experienced.

Furthermore, the teacher showed a smoke video that caused someone to cough when trapped in a room that had a fire, and students were asked to retell what they got from watching the video. The teacher shows the teaching aids so that students are curious about the learning material, then the teacher begins to introduce teaching aids to students by interspersed giving questions containing puzzles so as to encourage students to be interested in watching the pictures to be compiled, then the teacher asks questions after the drafting process is carried out, and the teacher checks the students' understanding by giving the Student Worksheet (LKS) and giving conclusions and students record the summary of the material provided.

Closing activities

In the closing activity phase, the teacher conducts an evaluation by giving an assessment sheet to each student. this is done to see the extent of the students' level of understanding of the material that has been taught. After evaluating, the teacher closes the lesson by giving motivation to students to be more active in learning at home, then the teacher and students close the lesson with prayer.

C. Cycle *1 Observation Stage*

The results of the observation during the learning process are still some students who lack focus and they are still less courageous to come to the front of the class, as well as teachers in guiding students are still lacking, so that the impact on achievement of learning outcomes. there are some students who have not been able to answer the evaluation questions correctly. The conclusion of the first cycle learning outcomes test is presented in Table 1 below.

Table 1
The First Cycle Learning Outcomes

Number	Student Name	Item of Question					Total Value
		1	*2*	*3*	*4*	*5*	
		10	*10*	*20*	*30*	*30*	
1.	A T	10	5	10	0	0	25
2.	A P	10	10	10	15	10	55
3.	A S	10	10	10	10	25	65
4.	A W	5	10	10	10	10	45
5.	G T	10	10	10	15	10	55
6.	G P	10	10	20	30	30	100
7.	G W	10	10	20	10	15	65
8.	J W	10	5	10	15	10	50
9.	J P	10	10	10	10	10	50
10.	M W	10	10	20	30	30	100
11.	L M	10	10	10	15	15	60
12.	M M	10	5	0	15	10	40
13.	N P	10	5	10	20	10	55
14.	S P	10	10	20	30	20	90
15.	S S	10	10	20	20	20	80
16	V M	5	5	10	10	10	40
17	R K	10	10	15	10	10	55
18	J P ·	-	-	-	-	-	-
19	R W	10	10	20	15	20	75
20	T G	10	10	10	10	10	50
21	T D	10	10	20	30	30	100
Total							**1.265**

Based on the data in table 1, it can be calculated learning completeness obtained in cycle 1 as follows:

$$\text{CL} = \frac{T}{Tt} x\ 100\ \% = \frac{1265}{2100} x100\% = 60.24\%$$

The results of the evaluation of the achievement of learning outcomes in the first cycle is 60.24%. Some obstacles encountered in the cycle 1 is students who are not

ready to learn, so students are not calm when the teacher conveys the learning objectives, some students do not pay attention to the material explained by the teacher, and the teacher also does not provide opportunities for all students to advance to front of the class to attach pictures of breathing apparatus humans and give opinions in front of the class about human respiratory material. So that the learning outcomes obtained by students have not been satisfactory or have not reached the criteria for research success.

Therefore, the role of the teacher in the learning process is very important by looking at the condition and situation of the class, so the teacher can analyze the way of teaching that can arouse enthusiasm and active students in the learning process.

D. Cycle *1 Reflection Stage*

Learning outcomes of student participation in the learning process in the first cycle is still very lacking and has not reached the research success criteria because the intended results are 75% that students must achieve. Therefore, the research continued in the second cycle.

Cycle II was conducted to correct deficiencies carried out in the first cycle, namely researcher did not fully prepare students before receiving lessons and did not provide an opportunity for all students to come to the front of the class to give opinions about human respiration so that not all students could understand and absorb what the teacher teaches.

E. Cycle 2 *Plan Stage*

So, in cycle II, before starting the learning the researcher prepares students first by arranging the seating of students and telling all students to be calm when the learning process begins and the teacher gives the opportunity for students to give their opinions about the material of human respiration.

F. Cycle 2 *Implementation Stage*

The implementation of cycle II activities follows the following steps:

Initial activities

In the initial activity, the teacher greets students and students answer greetings from the teacher. Then the teacher asks one of the students to lead the prayer in front of the class, and is followed by checking the attendance of the students. after that the teacher conditions a good learning situation by tidying up the tables, chairs, conveying the learning objectives and ensuring students to be ready to learn, and convey apperception. When the teacher gives questions to students, students respond well. There are some students answer questions from the teacher and the answers of students vary.

Core activities

At the core activity the teacher shows the teaching aids so that students are curious about the learning material that will be carried out, then the teacher begins to introduce teaching aids to students by interspersed giving questions containing puzzles so as to encourage students to be interested in watching the pictures to be compiled, then the teacher asks questions after the drafting process is carried out, and the teacher checks the students' understanding by giving the Student Worksheet (LKS) and giving conclusions and students record the summary of the material provided.

Closing activities

In the closing activity phase, the teacher conducts an evaluation by giving an assessment sheet to each student, this is done to see the extent of the students' level of understanding of the material that has been taught. After evaluating, the teacher closes the lesson by giving motivation to students to be more active in learning at home, then the teacher and students close the lesson with prayer.

G. cycle 2 *Observation Stage*

Results of the observation of the class teacher as an observer, it was stated that the researcher had carried out learning activities from the beginning to the end quite well. researcher could manage the class and achieve a learning atmosphere that was not tense and make students active in conducting learning activities by giving opinions in front of the class, experiencing improvements in the process of receiving lessons, actively paying attention to the opinions given by each student who comes to the front of the class. The conclusion of the second cycle learning outcomes test is presented in table 2 below.

Table 2
The Second Cycle Learning Outcomes

Number	Student Name	Item of Question					Total Value
		1	*2*	*3*	*4*	*5*	
		10	*10*	*20*	*30*	*30*	
1.	A T	10	5	10	20	20	65
2.	A P	10	10	20	20	20	80
3.	A S	10	10	10	10	25	65
4.	A W	10	10	20	30	30	100
5.	G T	10	10	20	20	30	90
6.	G P	10	10	20	30	30	100
7.	G W	10	10	20	10	15	65
8.	J W	10	10	20	20	20	80
9.	J P	10	10	20	30	20	90
10.	M W	10	10	20	30	30	100
11.	L M	10	10	15	20	20	75
12.	M M	10	10	20	20	20	80
13.	N P	10	10	10	25	20	75
14.	S P	10	10	20	30	30	100
15.	S S	10	10	20	20	20	80
16	V M	10	10	10	20	25	75
17	R K	10	10	15	20	20	75
18	J P ·	10	10	20	25	20	80
19	R W	10	10	20	15	20	75
20	T G	10	10	10	10	10	50
21	T D	10	10	20	30	30	100
Total							**1.720**

Based on the data in table 2, it can be calculated learning completeness obtained in cycle 2 as follows.

$$\text{CL} = \frac{T}{Tt} x\ 100\ \% = \frac{1720}{2100} x100\% = 81.90\%$$

The success of learning outcomes achieved in the second cycle was 81.90%.

H. Cycle 2 *Reflection Stage*

After making observations during the learning action taking place, the observation results are discussed by the researcher to assess the level of success obtained together

with collaborative partners consisting of researchers, teacher and principals. With the fulfillment of student achievement criteria, the researcher draws the conclusion that the results of this second cycle are satisfactory because the learning steps of the constructivism approach have been done well and the results of the second cycle have exceeded the Minimum Completion Criteria, so the class action research ends at cycle II or not proceed to the next cycle.

IV. DISCUSSION

Implementation of constructivism approach in cycle 1 science learning has not provided optimal results where student learning outcomes have not reached the Minimum Completion Criteria. Some obstacles encountered in the cycle 1 is students who are not ready to learn, so students are not calm when the teacher conveys the learning objectives, some students do not pay attention to the material explained by the teacher, and the teacher also does not provide opportunities for all students to advance to front of the class to attach pictures of breathing apparatus humans and give opinions in front of the class about human respiratory material. So that the learning outcomes obtained by students have not been satisfactory or have not reached the criteria for research success. this happens because researchers have not been able to carry out learning activities according to the learning process plan that has been made.

However, in the second cycle students' readiness for learning began to be seen so that students could observe the teacher's learning, so that when the teacher gave the opportunity to students to give opinions in front of the class students could do it well. Then the learning outcomes achieved in cycle II increased from the results of cycle I

Therefore, the role of the teacher in the learning process is very important by looking at the condition and situation of the class, so the teacher can analyze the way of teaching that can arouse enthusiasm and active students in the learning process. This is in line with Tuerah [6] opinion which states that the learning management ability of a teacher influences its performance.

One of the factors in the success of the learning process is the teacher. a teacher who is able to create optimal performance is a teacher who has contextual ideas in developing the learning process involves feeling as a professional teacher [7], but if in e-learning this might not be an obstacle [8].

In science learning in class, the internal factors of students are very large, because sometimes students are present with motivation to fill attendance rather than with motivation to seek more knowledge. Therefore, science teachers should use social modeling and collaborative-learning activities to foster students' motivation, achievement, and interest in science careers [8].

The research is continued in the second cycle by making improvements from the first cycle to achieve better results. the second cycle still using the constructivism approach with the belief can improve student learning outcomes [8]. The results obtained from the implementation of the action of two cycles showed good progress. The achievement of student learning outcomes in the first cycle 60.24% while in the second cycle 81.90%.

The implementation of constructivism learning models in science learning of two cycles, make the students can construct knowledge with the experience gained in learning activities. So, concluded the results achieved have reached the expected target.

The progress and improvement obtained during the two-cycle learning process shows that through the implementation constructivism approaches in science subject can improve learning outcomes of fifth grade students of SD Inpres 4/82 Walian. The results of the analysis showed that there was an increase, the development of teacher activities and student activities developed towards better student learning outcomes from cycle I to cycle II.

V. CONCLUSION

Research results show that the application of the constructivism approach to science learning in the fifth grade of elementary school Inpres 4/82 Walian is able to make students construct their knowledge of human respiration and provide optimal learning outcomes. Thus, it was concluded that the constructivism learning approach had an influence on science learning.

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