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THE INFLUENCE OF THE SETS (SCIENCE, ENVIRONMENT, TECHNOLOGY, AND SOCIETY) LEARNING MODEL ON STUDENTS' CRITICAL THINKING ON GLOBAL WARMING MATERIALS

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Abstract

In the 21st century, the education sector, especially in the science field, needs to develop facets of teaching methods, learning materials, and assessment strategies to prepare students to have creative thinking and ability to think critically. This study aims to determine the impact of the SETS (Science, Environment, Technology, and Society) learning model on students' critical thinking skills. This study used a quasi-experimental design as the research method and two-group pre-test and post-test testing as the instrument. The study population consisted of seventh grade students 5th Junior High School Percut Sei Tuan, with a sampling technique used cluster random sampling, making students of grades VII_3 and VII_4 the samples of this study. The results of this study showed that providing a SETS (science, environment, technology and society) model has a very significant effect for teaching critical thinking to students about global warming material in class of seventh grade students country 5 Junior High School Percut Sei Tuan.The thing that can be developed from this research by further researchers is to add media that can support the SETS learning model to get better results.

Keywords: SETS (Science, Environment, Technology and Society), critical thinking, global warming, learning model

Introduction

In the 21st century, the education sector needs to develop facets of teaching methods, learning materials, and assessment strategies for all subjects to prepare young people to live effectively in a changing world (Saleh, 2019). Education is a means or space to develop the personality and potential that exists in student in accordance with the values that apply in social life so that they experience change for the better (Irawati, 2021) The skills needed to meet the demands of 21st-century learning are to produce and shape students to have creative and critical thinking skills (Suryaningsih & Nisa, 2021). decision making ability is one of the higher-order critical thinking very important in equipping students to face future problems that are not only found in the learning process but are also found in everyday life in solving problems and making decisions. The study of natural sciences (IPA) requires students to have critical thinking skills, since science is a subject that studies natural phenomena that are authentic and have a cause and effect of what happens. (Sulistyowati, 2014).

According to the results of the critical thinking test according to the results of the test carried out researcher among students of grades VII3 and VII4 of the country 5 Junior High School Percut Sei Tuan, the test results showed that (26.6%) students are not critical, (35%) are less critical, (20%) quite critical, (13.3%) critical and very critical namely (5%). The results of interviews with science subject teachers at SMP Negeri 5 Percut Sei Tuan, science subject teachers often use direct instruction models with lecture methods and question and answer methods. The SETS (Science, Environment, Technology, and Society) A learning model is a learning model that integrates the concepts of science, environment, technology, and society into a coherent whole to equip students with higher-order thinking skills, one of which is student Ability to think critically. (Umar et al, 2010). The learning model that can effectively be used by teachers to transfer knowledge well and Correct (Cerling et al, 2020) Global Warming is one of the science learning materials which is one of the problems that occur in everyday life. The presentation of material on global warming certainly requires innovative and progressive teaching to increase the attractiveness of students, so that students' knowledge and attitudes towards environmental protection are increased and they can apply them in everyday life. Therefore, this study aims to determine the impact of the SETS (Science, Environment, Technology, and Society) A Model for Teaching Critical Thinking to Students About Global Warming Materials in Class seventh grade students' country 5 Junior High School Percut Sei Tuan.

Research Method

This study belongs to the type of quasi-experimental studies. The conduct of this study included two classes, namely an experimental class and a control class. The instrument design in this study was the Two Group Pre-test Post-test. This design was carried out on two different groups that received different treatments. The experimental class worked with the SETS learning model. The control class was subjected to direct intruction(direct learning). The study included students of the seventh grade of SMP N 5 Percut Sei Tuan, with a sampling technique usedcluster random sampling, making students of grades VII_3 and VII_4 the samples of this study.

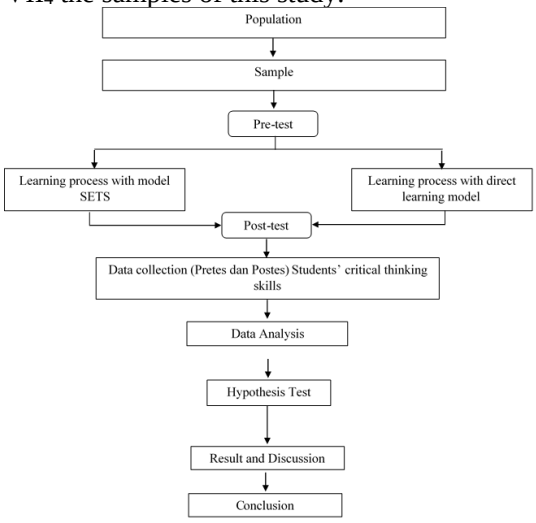

Figure 1. The flow chart of research procedures

Result and Discussion

After the test was tested in another class (VIII) and looked for test validation, it was found that from the 25 questions tested, 20 valid questions were found, and 5 questions were invalid. According to the results of calculating the level of difficulty of questions,

3 questions were identified in the category of difficult, 20 questions in the category of medium and 2 questions in the category of easy. The results of the calculation of the different power tests carried out on 25 questions obtained 10 in the good category, 12 questions in the sufficient category, and 3 questions in the category low. The overall test reliability analysis obtained a test reliability coefficient of 0.7931. Meanwhile, the rtable price is obtained from the list of product moments at = 0.05 with N = 28, so that r11 > rtable (0.7931 > 0.3740). Thus, it can be deduce that the overall test of learning outcomes is reliable. The data from this study reflect the critical thinking skills of two different classes that were treated differently. The experimental class worked with the SETS learning model. The control class received directly observed treatment. Observations before treatment are called pretests and observations after treatment are called posttests..

Table 1. Pre-test and Post-test Data for Control and Experiment Class

Statistical Results	Pre-test		Post-test	
	Direct Intruction	SETS	Direct Intruction	SETS
Average ($\bar{x}$)	39,8	45,5	70,3	81
Mastery Level (%)	Not Critical	Less Critical	Critical	Very Critical
Standard Deviation (SD)	14,1	18,39	9,37	10,88
Varians (S^2)	199,1	338,1	87,8	118,5
Range (R)	65	70	40	50
Median (M)	40	45	70	80

Based on Table 1., it is known that the average pre-test score for the control class usedthe direct instruction model is 39.8 including the non-critical category and the experimental class usedthe SETS (Science, Environment, Technology, and Society) model is 45, 5 is included in the less critical category. The average post-test score for the control class usedthe direct instruction model is 70.3 including the critical category and the experimental class usedthe SETS model is 81 including the very critical category. In the post-test results, the standard deviation and variance experimental class were higher than those of the control class, meaning that the level of diversity was greater in the group of students receiving the SETS learning model.

A analogy of the average value of leaners critical thinking expertise in direct instruction and SETS as each facet in full can be seen in Figure 2.

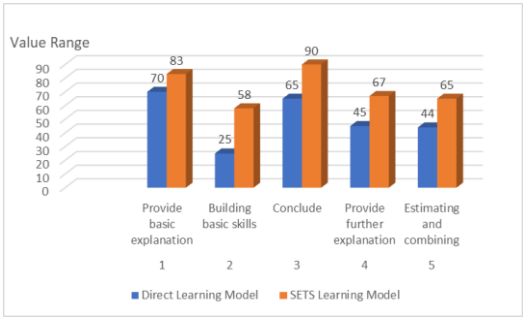

Figure 2. Analogy of Average Post-test Facets of Critical Thinking

Based on Figure 2., it is known that every facet of critical thinking is greater in SETS (Science, Environment, Technology and Society) learning than in direct learning. 1). Simply put: direct intruction with a score of 70 goes into the critical thinking category and SETS learning with a score of 83 goes into the very critical thinking category. 2). Building basic skills, direct instruction with a score of 25 is included in the category of

uncritical thinking, and SETS learning with a value of 58 is categorized as moderately critical thinking. 3). In deduce, direct instruction with a score of 65 belongs to the category of moderately critical thinking, and SETS training with a score of 90 is in the category of very critical thinking. 4). Providing further explanation, direct instruction with a value of 45 is included in the category of less critical thinking, and SETS learning with a value of 67 is included in the category of critical thinking. 5). Estimating and combining, direct intruction with a score of 44 belongs to the category of less critical thinking, and SETS learning with a value of 65 belongs to the category of moderately critical thinking.

Based on the normality test of the critical thinking ability of the control class and experimental class students usedthe Lilliefors test, it was found that the pre-test and post-test scores of both control and experimental groups had normal data or Lcount < Ltable at level = 0 ,05 and n1 = 30 and n2 = 30. The results of the pre-test and post-test normality test. These two classes are shown in Table 2.

Table 2. Normality test analysis results

No	Data	L_{count}	L_{table}	Deduce
1	Pre-test control class	0,1356	0,161	Normal
2	Pre-test experimental class	0,0841	0,161	Normal
3	Post-test control class	0,1153	0,161	Normal
4	Post-test experimental class	0,1244	0,161	Normal

In Table 2. It was obtained that the class sample that was given the direct instruction model treatment obtained the value of Lcount = 0.1356 (pre-test) and Lcount = 0.1153 (post-test), while in the class that was treated with the SETS learning model the value of Lcount = 0.0841 (pre-test) and Lcount = 0.1244 (post-test).

According to the test criteria, the sample is accepted from a normally distributed population if Lcount < LTable and rejects the test criteria if the conditions are not sufficient. Based on Table 4.4. In this case, the value Lcount < LTable is obtained, so the Ho criterion is accepted. From the sample in the control class and test class, it can be inferred that comes from a normally distributed population.

Be based on the proceeds of the homogeneity test in this study for the experimental class and the control class, it was found that the Fcount value = 1.6981 from the F distribution price table with a significant level = 0.05, so the value of Ftable = 1.8608 was obtained. Because the value of Fcount < Ftable, it can be close pre-test population data for the experimental class and control class are homogeneous. Meanwhile, for post-test experimental class and control class, we get Fcount = 1.349 with Ftable = 1.8608, then Fcount < Ftable, so we can conclude that post-test population data in experimental class and control class are homogeneous. The results of the homogeneity test are shown in Table 3.

Table 3. Test of the homogeneity of the data pre-test and post-test control class and experimental class

Data	Sample	N	F_{count}	F_{table}	Description
Pre-test	Control class	30	1,6981	1,8608	Homogeneous
	Experimental class	30			
Post-test	Control class	30	1,349	1,8608	Homogeneous
	Experimental class	30			

Based on the homogeneity test results,it was obtained that Fcount < FTable for each pre-test and post-test data, so Ho was accepted. The sample in the control class and in the experimental class it can be concluded that it comes from a population with homogeneous variance. Based on the results of the t-test test, shows that there is no difference between the experimental and control classes, and is still relatively low. This

is because students have not received the SETS learning model. Hypothesis testing was carried out by t-test with a significant level of = 0.05. The t-test was conducted by comparing the average value (posttest) of students' critical thinking skills after obtaining a learning model with different treatments.

Table 4. Post-test t-test

Class	Average	t_{count}	t_{table} $\alpha = 0,05$	t_{table} $\alpha = 0,01$	Description
Control (N = 30)	70,3	3,9312	2,0017	2,663	Ho is rejected and Ha accepted
Experimental (N = 30)	80,6				

Based on the table of the results of the t-test calculation above, the Tcount is 3.9312. Meanwhile, Ttable (dk = 58) at a significant level of 0.05 is 2.0009 and a significant level of 0.01 is 2.663. This means that Tcount is greater than Ttable, so Ho is get the air and Ha is acceptance. Thus, it can be interpreted that there is a very significant effect on providing the SETS (Science, Environment, Technology, and Society) learning model on students' critical thinking skills on global warming material in class VII SMP N 5 Percut Sei Tuan T.P 2021/2022. The effect is seen in the post-test average value of the experimental class that applies the SETS learning model which is higher than the class that uses the direct instruction model, which is 81 and 70.3 with a difference of 10.7.

Learning uses the SETS (Science, Environment, Technology, and Society) model, namely learning that provides opportunities for students to apply technology in studying science so that it has a good impact on the environment and society. This is in accordance with Wati's statement (2022) that students can integrate the concept of learning with four components, namely science, environment, technology, and society in everyday life to encourage students to collect, solve problems, consider solutions as alternatives to problems so that they can practice them. directly.

The stages of the SETS learning model: 1) The invitation stage, which is to explore the opinions of each student on a problem that is developing in the community to stimulate students to find solutions to actual problems. At this stage, students seem to show high enthusiasm when students observe the problems being presented by the teacher, based on the previously acquired knowledge related to the subject matter. This is in accordance with what Amri said, namely critical thinking makes students use their intellectual abilities by thinking rationally through student analysis in making decisions (Amanda et al, 2018); 2) The exploration stage, that is, students try to understand the problem that is being presented by the teacher. Students analyze and identify a problem first to make it easier for students to understand the problem so that students can seek and find solutions based on their abilities. This is in accordance with what Kusmianty et al., (2020) said that activities that engage students in learning that requires higher cognitive abilities can train and develop students' critical thinking skills; 3) The solution stage, where students carry out group work to discuss and exchange opinions to take a good solution and then relate the subject matter to the surrounding environment; 4) The application stage, where the teacher gives feedback to students to be able to provide reinforcement to the concepts obtained by students. Students can provide explanations from observations from their analysis in accordance with the literature and utilize the environment as well to obtain information. This statement can be supported by Andrayani's opinion which states that making the surrounding environment a medium for students is one of the optimal sources of learning for the achievement of the educational process so that learning will be more contextual in helping students to relate

learning material knowledge and its application in everyday life. days so that learning can be more meaningful (Maulidati et al, 2018); 5) Concept stabilization stage, namely strengthening the concepts obtained by students and assessing students' abilities in learning activities. The teacher strengthens the concepts obtained by students to know science, use technology, and the development of science and technology that can affect the environment and society.

Conclusion

Based on the results of the analysis and discussion in the previous section it is deduce that: There is a highly significant impact on the provision of the SETS (Science, Environment, Technology, and Society) learning model on students' critical thinking skills on global warming material in class VII SMP N 5 Percut Sei Tuan T.P 2021/2022.

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