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Effect of The Problem Solving Learning Toward Critical Thinking Skills in Subject Matter of Global Warming

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ABSTRACT

Students' critical thinking skills are low because in the learning process the teacher does not apply learning models that can improve students' critical thinking skills. One learning model that can facilitate efforts to improve critical thinking skills is the learning model problem solving. The learning model of problem-solving is one that can help with activities to develop critical thinking skills. This research purpose to see wheter there is an impact of the problem solving learning application on the skills of critical thinking for class X students in lesson global warming. The research type applied in this research was research although quasi-experimental (like an experiment) with research design Randomized Control Grup Pretest-Posttest Design. The research population were all class X Phase E. The research sample was class XE 7 as the class for experimental and class XE 6 as the class for control. Sampling was conducted using technique by purposive sampling. Analysis of the research results using statistical methods. The data analyzed were using the two average difference. Based on the research that has been done and followed by analyzing the research data, the analysis of data shows that the hypothesis was obtained where 11.26 < 2.00 means H_O rejected and H_1 is accepted, we got conclussion that there is a significant effect of the problem solving learning on the skills of critical thinking for class X students in lesson global warming. The results of this study are expected to assist teachers in selecting appropriate learning models to improve students' critical thinking skills

Keywords : *Critical Thinking Skills; Global Warming; Problem Solving Learning.*

I. INTRODUCTION

Curriculum development is a method for improving the standard of education.. [1]. The implementation of the curriculum that has been used will reveal the appropriate educational policy since "the curriculum is the education heart" and reveal whether or not education will continue [2]. A new policy known as "Merdeka Belajar" was developed by the Education Ministry and Culture of the Indonesia Republic. "Merdeka Belajar" was created by the Ministry of Education and Culture of the Republic of Indonesia Nadiem Anwar Makarim, and it has the essence of freedom in the pattern of thinking which means that every school, teachers, and Students have the ability to choose innovate in the teaching and process of learning. The primary subject, the teacher, is supposed to be able to function as a motivator to perform actions that giving positive things to student [3]. The introduction of a separate curriculum represents a restructuring of Indonesia's national education system, which was designed to promote national progress and welcome change [4].

The teaching and process of learning application in Indonesia does not encourage the achievement of skills of critical thinking [5]. In general, physics teachers tend to use the lecture method. Physics teachers tend to use this method due to time constraints, pursuing materials and inadequate infrastructure [6]. The learning applied by the teacher is still more dominant in the knowledge aspect and conceptual understanding, does not require students to be active and train students in critical thinking[7].

Critical thinking has a role important in preparing students in solving problems, explain reasons and make evaluation of information [8]. Skills of science can be honed by the skills to think critical and phase in finding new concept of learning activities [9].

The ability to assess a situation using facts and evidence in order to make a conclusion is known as critical thinking. The capacity to create and defend arguments from evidence organized into intricate choices or concepts is another aspect of thinking critically [10]. In order to investigate a data or fact, critical thinkers are able to evaluate data or information in a methodically organized fashion using logic. However, critical thinkers do not just accept factual statements as people tend to do [11].

The application of the lecture method makes learning in class only run in one direction, for to conceal the students' participation in the process of learning. Students still don't approach learning with enough curiosity or critical thinking. As a result, students' critical thinking abilities are reduced.This is proven by the analysis pretest findings, which are displayed in Figure 1 as critical thinking skills.

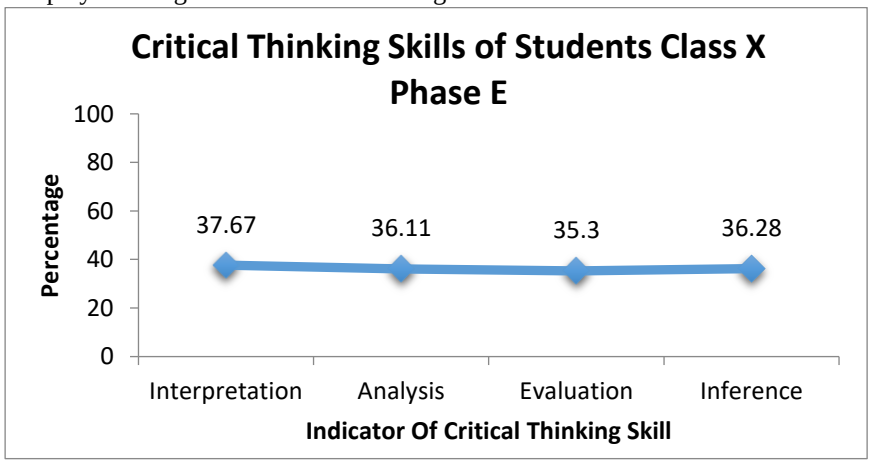

Fig. 1. Graph the Skills of Critical Thinking for Student Class X Phase E

Figure 1 illustrates how students' critical thinking skills in class X Phase E of the SMAN 10 Padang, are still in the developing stage and require development. Into develop skills of critical thinking there needs to be an innovative learning model, students are actively involved and not just used as objects. Learning is no longer centered on educators, but on students.

One type of learning that can facilitate activities in an practice to develop critical thinking skill is one that emphasizes a problem, namely the learning in problem solving [12]. Due to the fact that problem solving is a means of thinking, communicating, gathering and analyzing information, and finally making conclusions, learning in problem solving is a model of teaching that can help students' thought processes. By using the learning in problem solving students will participate in learning activities, think systematically, able to mede sign an invention and realistically, investigate in a good way, and able to evaluate and interpret findings [13]. Students using the problem-solving learning approach are presented with a variety of issues that force them to try and relate their prior knowledge to the new situation.

An activity that focuses on solving problems is one model of learning that can help with activities meant to enhance critical thinking skills. Because problem solving is more than just a teaching strategy, it is also a way of thinking, communicating, gathering and analyzing information, and finally making conclusions.This means that learning in problem solving can help students develop their critical thinking skills. Students who apply problem-solving learning will engage in educational activities, think systematically, be able to mede sign an invention and realistically, explore effectively, and be able to assess and analyze results [14]. Students using the problem-solving learning paradigm are presented with a variety of issues that force them to attempt to connect what they already know [15].

Based on the information stated, researchers are interested in doing study. "The learning in problem solving model effect on skills of critical thinking in global warming," according to the research title. This study was to investigate the impact of the problem-solving learning paradigm on SMAN 10 Padang students in class X Phase E in regards to their skills of critical thinking by student SMAN 10 Padang.

II. METHOD

The research methodology employed here is the quasi-experiment approcah. While this method incorporates a control group, it is not entirely effective in regulating external variables that influence the experiment's execution [16]. In conducting this study, the sample population was segregated into two groups: the group for experimental, which apllies learning in problem solving model, and the group for control, which was not given treatment of using the learning in problem solving model. Then the group for experimental and control grup were given the same test. The design for research shown in table 1.

Table1. Research Design

Kelas	Pretest	Treatment	Posttest
Eksperimen	T_1	X	T_2
Kontrol	T_1	-	T_2

(**Source: Ref** [16])

Information :
X = Learning using learning in problem solving model
T_1 = preminary test before being given treatment
T_2 = Final test after being given treatment

All of the class X Phase E students at SMAN 10 Padang who were enrolled in the 2022–2023 academic year even semester comprised the research's affordable population. Purposive sampling was used to conduct the sampling for this investigation. The sample selection was carried out with the consideration of the subject teacher who categorized two classes that were homogeneous and had the same average ability in terms of the results ofthe daily assessment and the final assessment of the odd semester. The two classes were class X Phase E.6 as the control group and class X Phase E.7 as the group for experimental.

The impact of learning in problem solving model the study's independent variable. The research's dependent variable is students in class X phase E critical thinking skills. The study's controls were the 2013 curriculum-aligned materials, identical starting skills between the two classrooms, equal learning time, similar resource books, comparable teachers, and matching numbers and exam questions.

The technique for data collection used the final test questions in the form of essay test as many as 10 questions. The four indicator of critical thinking skill there are interpretation, analysis, evaluation, and inference were applied in the data analysis process. The items used in this test have been tested for validity, reliability, difficulty level and differentiation. The technique for data analysis uses test of normality by liliefors test and test of homogeneity by F test. Data requirements are normally distributed Lh< Ltand data requirements have homogeneous variance Fh< Ft. After the data have distributed in normal and homogeneous, hypothesis testing is conducted by the t test to reveal whether H0 is accepted or rejected. H0 testing conditions are accepted if th< tt and H0 is rejected if it has another price at a significant level of 0.05.

III. RESULTS AND DISCUSSION

A. Result

The final test (posttest) given to both the class for experimental and the class for control at the conclusion of the study provided information on the students' critical thinking skills. A written test consisting of 10 essay questions was employed by the researcher.In Table 2, the study data for the class for experimental and class for control are described.

Table 2. Average, Highest, Lowest Value, Standard Deviation and Sample Class Variance

Class	N	Values		$\bar{X}$	S^2	S
		Highest	Lowest			
Eksperimen	36	93	66	82,00	53,73	7,33
Kontrol	36	79	51	65,50	76,73	8,76

Table 2 shows the statistically determined values in average for the critical thinking skill of students in the class for experimental and the class for control. The table shows that the class for experimental 's average score on critical thinking is greater than the class for control 's average score on knowledge competency.The normality

test used is the test of Lilliefors. The test for normality was condcuted to find out whether each sample came from a normally distributed population or not. The normality test results obtained the values L_0 and L_t at a significance level (α) of 0.05 for N = 36, as shown in table 3and at a level of significant is 0.05 as shown in Table 3.

Table 3. The two Sample Classes' Normality Test Results

Class	N	α	L_0	L_t	Infromation
Experimental	36	0,05	0,126	0,147	Normal
Control			0,118		

Table 3 shows that the Lo < Lt values for the two sample classes are significant at 0.05. This indicates that the final test results for both sample groups are drawn from populations with a normal distribution. To ascertain whether the variance between the two sample groups was homogeneous, a homogeneity test was conducted. The test for homogeneity was conducted using the F test. The test for homogeneity results for the class in two sample are shown in Table 4.

Table 4. The two Sample Classes' Homogeneity Test Results

Class	N	S	S^2	F_h	F_t	Information
Experimental	36	7,33	53,72	1,19	1,76	Homogen
Control		8,76	76,73			

Table 4 shows, the sample has a value of $F_h < F_t$. This indicates a homogeneous variance in the data of the class in two sample. The final test data's normality and homogeneity tests revealed that both sample classes had homogenous variance and were usually distributed. Hence the t-test was chosen as the hypothesis test for the two sample classes, as shown in Table 5.

Table 5. Hypothesis t test Results Critical thinking skill of Sample Class

Class	N	$\bar{X}$	S^2	t_h	t_t
Experimental	36	82,00	53,73	11,26	2,00
Control		65,50	76,72		

Table 5 shows that the results of the critical thinking skill test consist of two sample classes, the class for experimental and the class for control. acceptance area H0 with a significant level (α)=0.05 it is obtained th > tt with dk = 70 so that $t_{(0,958)(70)}$= 2.00. Because of value th outside the acceptance area H_0 then H_1 accepted. This represents the impact of the problem-solving learning model on students skills of critical thinking by class X at SMA Negeri 10 Padang.

Students' skills of critical thinking in two sample classes can be seen in Figure 2. These results were obtained from the results of posttest processing which consisted of 4 indicators.

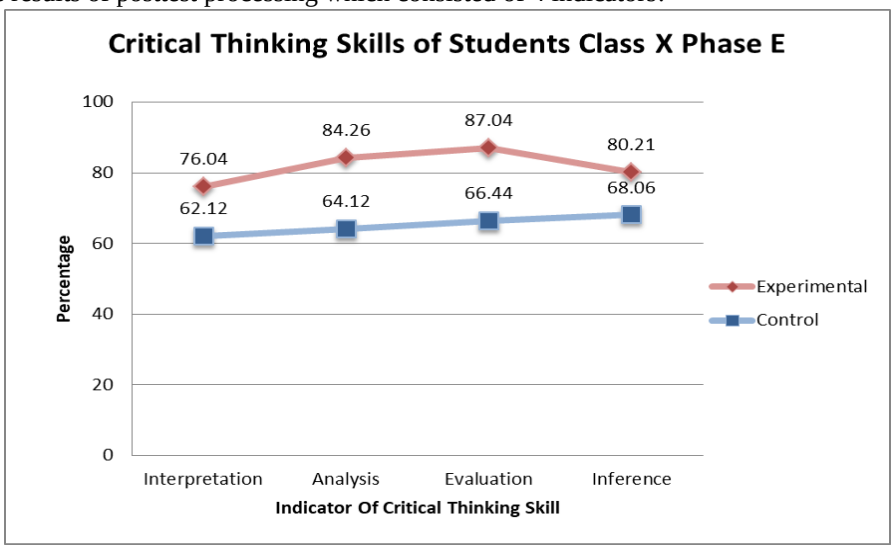

Fig. 2. Graph of Critical Thinking Skills Students in The Sample Class

Figure 2 shows how the class for experimental 's students critical thinking skill are superior compared to that of the group for control. This occurred as a result of the class for experimental obtaining greater attention than the class for control. Therefore, class X students at SMAN 10 Padang's problem-solving learning model has an significant effect on their critical thinking skills.

B. Discussion

The application of problem solving is based on its advantages which emphasize the ability to solve problems development that involve students' experiences in everyday life. Learning model of problem solving provide understanding to students that teachers are not the only source of knowledge. Knowledge can also be obtained from various sources of information so that each student has the opportunity to share information with colleagues according to their respective abilities [17]. In the process of learning it does not have to come from the teacher, students can find existing information by themselves by utilizing existing facilities.

Students are actively engaged in learning through the model of learning in problem-solving.According to research, using problem-solving can enhance learning [18]. Students are allowed to investigate the lesson material in accordance with the answers to the questions they are exploring. Students' enthusiasm in learning develops as a result of their active participation in the process of learning, which helps them understand the subject matter better. "The use of problem-solving models in learning physics can improve interest of students' for learning," claims that.This is demonstrated by the fact that the class using the model of learning in problem-solving has greater average knowledge competency than the class using conventional learning models [19].

The study's findings demonstrate that encouraging problem solving makes students more engaged in their education. This can be seen by the fact that classes using the model of learning in problem-solving on average have greater knowledge competencies than those using conventional educational models. The average knowledge competency class that uses problem-solving learning has a value of 82.15, whereas the average knowledge competency class that uses conventional learning models has a value of 62.15.

This is consistent with research that found the learning in problem solving model to be effective in enhancing students' learning outcomes and skills of critical thinking across all areas of chemistry studies, including chemistry and science courses in postsecondary institutions [20]. To ensure that students' critical thinking skill grow to their full potential, the learning in problem solving model encourages students to learn how to find their own information.

This research was conducted using a posttest of 10 essay questions containing indicators of skills of critical thinking which were carried out at the end of the lesson. there are differences in students' critical thinking abilities between students who are taught with the learning in problem solving model and students who are taught without using the learning in problem solving model. This is evidenced by the average critical thinking ability of the class that applies the learning in problem solving model higher than the class that applies conventional learning models. The values in average of the class's skills of critical thinking that apply the learning in problem solving model is 82.00 while the values in average of skills of critical thinking in classes that apply conventional learning models is 65.50.

By using methods that encourage active participation from students and make use of their cognitive abilities while using concepts and resolving problems skills in critical thinking can be developed [21]. Providing investigative questions, developing students' problem-solving skills, and having students draw conclusions based on their findings can all help strengthen critical thinking skills [22].

In this study, the overall score of students has not been able to reach the maximum value, this is due to the constraints experienced during the research. Among them, not all students are enthusiastic and have a high curiosity and are diligent in carrying out the learning model stages used. This has an impact on the value obtained by students, because in a series of learning all activities conducted by students are assessed.

The next obstacle was that the class conditions during learning became a little difficult to control because the students in each group started discussing with each other and were enthusiastic in expressing their respective opinions. This can be overcome by reminding students to maintain a more conducive learning atmosphere and inviting students to respect each other in group discussion.

IV. CONCLUSION

After employing a model of learning in problem-solving and data processing, differences between the experimental and class for control critical thinking test results were discovered. On the critical thinking abilities test, it was found that classes using the learning in problem solving model scored on average of 82, whereas classes using other learning model scored on average of 65. The application of the model of learning in problem-solving has a positive impact on students' capacity for critical thinking skill. The results of this study are expected to be applied by teachers learning models that can attract attention and develop critical thinking skills. Therefore, using the model of learning in problem-solving can help students develop their critical thinking skills.

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