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THE INFLUENCE OF INQUIRY LEARNING MODEL WITH AUDIO VISUAL AND SCIENCE PROCESS SKILLS ON CRITICAL THINKING SKILLS IN ANIMAL AND HUMAN BREATHING MATERIALS

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Abstract

This study aims to determine the differences in the critical thinking skills of children who are taught with the learning model inquiry with audio-visual and based on Science Process Skills, as well as the interaction between the two models with the child's Science Process Skills level in influencing the improvement of students' critical thinking skills. The research was carried out at the Nurul Hasanah Private Elementary School in the odd semester of the 2021/2022 academic year. The sample in this study consisted of classes VA and VC which were taken by purposive sampling class. The VA class as an experimental class was taught using an Audio Visual-based inquiry learning model, while the control class was taught using a direct learning model, the VC class was chosen. The type of research used in this research is quasi-experimental. The research design used is Posttest Only Control Design. Based on the results of the analysis and research findings from the field, several conclusions were obtained which were the answers to the questions in the problem formulation.

Keywords: *Critical Thinking Skills, Science Process Skills, Inquiry Learning and Scientific Attitude.*

A. Introduction

Critical thinking skills are thinking skills that must be possessed by every student as a result of the learning process. Critical thinking skills will bring students to be able to solve problems with appropriate evidence and theory. One of the critical thinking skills can be obtained through science learning. Science learning is not just scientific knowledge, there are at least three things that students will get when learning science, namely first: providing knowledge in the form of facts, concepts, and theories, Second: process ability in carrying out scientific activities and scientific attitudes, Third: students will have great curiosity, imagination and high enthusiasm to propose.

Learning is a conscious effort from a teacher to teach students (directing student interaction with other learning resources) in order to achieve the expected goals (Trianto: 2018:17). From this explanation, it can be interpreted that in learning there must be interaction between teachers and students, so that communication occurs that is directed at the goals to be achieved that have been previously set.

Thinking occurs in every human mental activity that functions to formulate or solve problems, make decisions and find reasons (Wariyanti:2019). Based on the process of thinking can be grouped into basic thinking and complex thinking. Complex thinking is high-level thinking consisting of critical thinking, creative thinking, problem solving and decision making (Costa, in Tawil & Liliana: 2013: 4).

Each learning process is expected to improve critical thinking skills. SThe standard content of science subjects should be carried out through scientific inquiry (scientific inquiry) to foster the ability to think, work and behave scientifically and communicate as an important aspect of life skills (Depdiknas: 2006). Based on this

opinion, it is highly expected that students have critical thinking skills so that they can solve problems or phenomena that occur in their lives.

Critical thinking is one of the goals in the learning process because it will produce understanding and thinking that can be trusted and convincing so that it can be used as a reference for action. This critical thinking ability can be trained and can be developed. Related processes in science learning to achieve critical thinking skills can be implemented by applying science process skills (KPS).

The science process skills approach is defined as an insight or role model for the development of intellectual, social and physical skills originating from the basic abilities of students. Process skills emphasize the growth and development of a number of skills in students so that they are able to process information to process facts, concepts, and develop concepts and values (Tawil & Liliasari: 2014: 8). The application of science process skills must be supported by the presentation of facts that can be directly observed by students, but in reality not all facts are able to be presented by the teacher to the classroom. The use of audio-visual media is an alternative in presenting facts that students need in the process of thinking and understanding concepts.

Showing videos that are in accordance with learning materials as learning media can be one solution that teachers can do. Video or audio visual media can complement the basic experiences of students when they read, discuss and practice. But in reality in the field there are still teachers who only provide conventional learning, namely the lecture method and based on textbooks.

Based on interviews with the science teacher at SD Nurul Hasanah Tembung, it was found that students still often asked about the meaning of the questions presented. Students have not been able to present logical and detailed answers. The results of interviews with 3 teachers who are good at science lessons stated that only a few students were able to write answers or answer questions in detail and reason, develop their thoughts based on previously obtained information, link learning materials with phenomena that exist in everyday life. While some are just waiting for an answer from their friends, so that there is no critical thinking process. In the initial observation, it was also found that learning was only one-way, namely from teacher to student, the question and answer activity is still passive because the only students who can answer the teacher's questions are those who rank in class. Based on the Learning Implementation Plan (RPP) compiled by the teacher, it shows that the method used is only the lecture method. The problem is because the teacher does not know the models and methods of variation in learning, so when teaching the teacher provides material without applying the learning model so that it makes students bored.

In addition to the problems above, learning in schools is also still textual. The source of learning is only from books, so students memorize facts from books without understanding the information they get. Critical thinking skills have not been developed in solving scientific problems. This results in low critical thinking skills of students and there are still students who get scores below the KKM.

The ability of students who are able to relate phenomena and materials that have been studied is one form that students have an understanding of learning materials. In addition, this also means that students have been able to develop their thinking skills. The ability of

students' thinking skills can be developed and trained through a good learning process. A good learning process, of course, cannot be separated from the application of learning models that are in accordance with learning objectives.

The learning model is a design that describes a detailed process and the creation of an environmental situation that allows students to interact, so that changes and developments occur in students (Amri, 2016: 4). According to Joyce (in Trianto, 2018: 22) the learning model is a plan or pattern which is used as a guide in planning learning in the classroom to determine the learning tools included in it.

The inquiry learning model is a learning model that has the aim of improving scientific thinking skills, one of which is critical thinking skills. Arends (2013: 46) explains that the results of the incorrect inquiry learning model are developing thinking and reasoning skills, developing metacognitive skills and developing positive attitudes towards inquiry.

The inquiry learning model is designed to invite students directly into the scientific process in a relatively short time (Trianto, 2018:167). Inquiry learning is learning that includes learning that includes many scientific activities such as observation, question and answer, reviewing, investigating, collecting, analyzing and interpreting words, predicting and conveying information (Arsal, 2017).

From the explanation above, it can be stated that the inquiry learning model can be applied to achieve the expected learning objectives, one of which is improving critical thinking skills.

B. Method

1. Research sites

The study was conducted in the odd semester of the 2021/2022

academic year at the Nurul Hasanah Private Elementary School, Percut Sei Tuan District, Deli Serdang Regency. This school has two types of classes, namely PLUS and Regular classes. This school's address is at Jalan Amal Bakti No. 69 B Pasar 7 Tembung, Percut Subdistrict, Sei Tuan, Deli Serdang Regency.

2. Population and Research Sample

The population in this study were all fifth grade students of SD Private Nurul Hasanah Tembung totaling 59 students consisting of 3 classes, namely Class VA totaling 20 students, VB totaling 20 students and VC totaling 19 students. From 3 (three) classes, the sample of this research was taken 2 (two) classes totaling 40 students.

3. Research variable

The variables in this study consisted of three variables, namely:

1) Independent variable: inquiry learning model
2) The dependent variable: critical thinking skills
3) Moderator variable: science process skills

4. Types and Design of Research

This type of research is a quasi-experimental research (quasi-experimental), namely research that aims to determine whether there is a consequence of something imposed on the subject, namely students.

The design used is a design that uses pretest and posttest. This design is the most effective for showing the term causal relationship. This study involved two classes that were given different treatments where the experimental class was treated using the Inquiry learning model, while the control class was treated with the direct learning model. This quasi-experimental research design was designed using the Posttest Only Control Design.

5. Research Procedure

The design of the research procedure is described as follows:

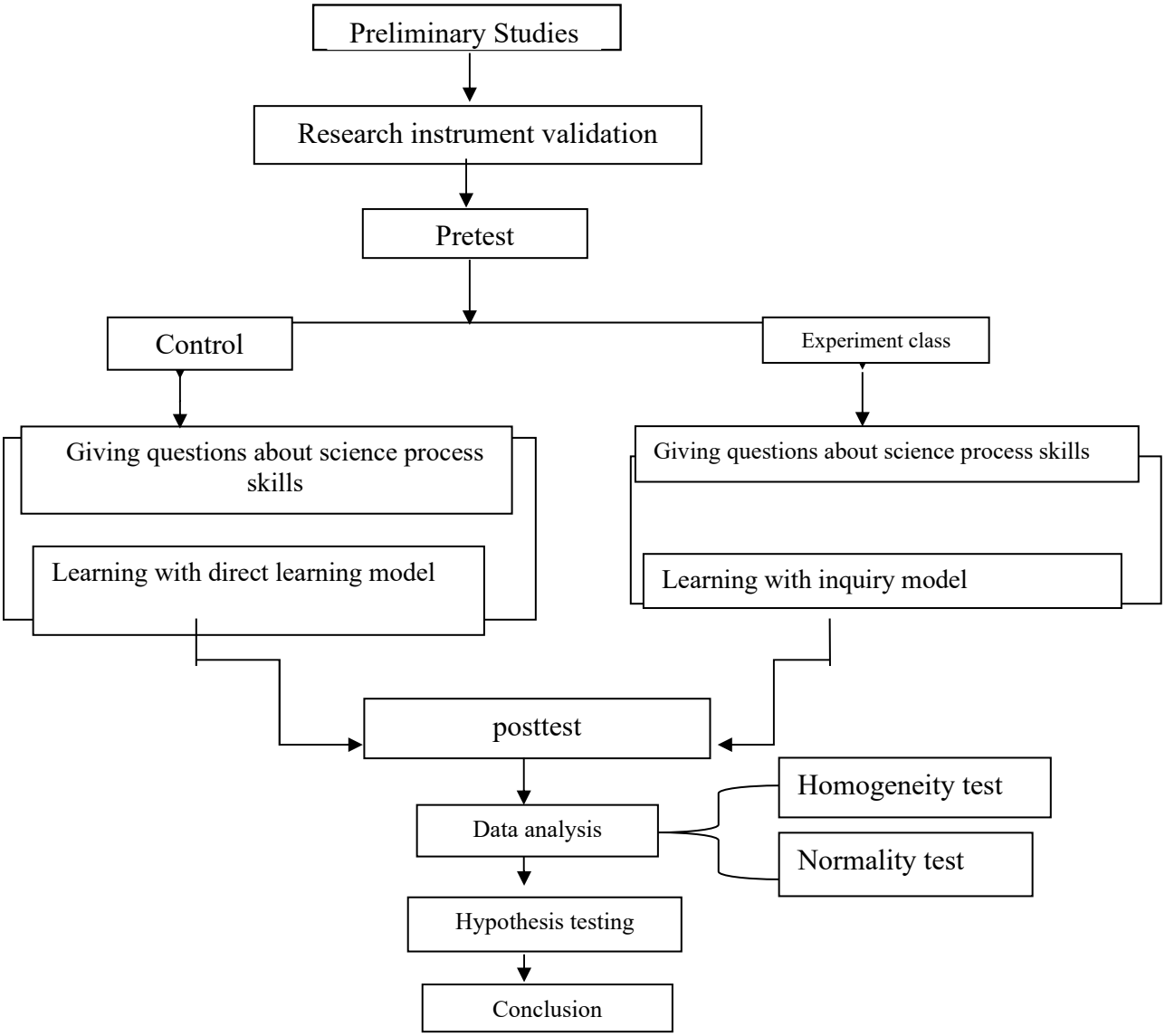

Figure 1. Research Implementation Flowchart

6. Data collection technique

Research instruments

Research instrument is a tool used by researchers to collect research data. Arikunto (2014: 203) research instruments are tools used by researchers in collecting data to facilitate their work and the results are good. The quality of the instrument greatly determines the quality of the data collected.

Expert Validator on Learning Tools

The validity of the tool is focused on the content, format, language and illustrations as well as the suitability of the device with Inquiry-based learning.

Expert Validator on Learning Outcome Test

Instrument validation focused on content, language, and illustrations as well as suitability for learning.

Expert Validator on Audio-Visual Learning Media

Media validation is focused on the suitability of language, material, and image and sound illustrations.

Instrumental Trial

Instrument trials includeContent Validity Test, Item Validity Test, Reliability Test, Difficulty Level Test, Differential Power Test

7. Data analysis

In this study, the power analyzed is the result of the test given to students. The following are the steps for processing the data obtained: Calculating Normalized Gain (N-gain), Determining the Mean, Determining the Standard Deviation, Data Normality Test, Variance Homogeneity Test and Research Hypothesis Test

C. Finding and Discussion

1. Result

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Description of Instrument Trial Results

The instruments used in data collection were a test of students' critical thinking skills and a science process skill questionnaire. The instrument has been tested through tests of validity, reliability, discriminating power and level of difficulty.

Pretest Data Students' critical thinking skills

Table 1. Pretest Data Students' critical thinking skills

	Class		Statistics
Pretest	Experiment	mean	50,20
		median	50.00
		Std. Deviation	11,786
		Minimum	32
		Maximum	72
	Control	mean	37.47
		median	36.00
		Std. Deviation	9,448
		Minimum	20
		Maximum	60

From table 1 The above shows that the average pretest of students' critical thinking skills in the experimental class is 50.20 and for the control class the average pretest is 37.47. The standard deviation for the experimental class is 11.78 and the control class is 9.45. The results of the experimental class and control class pretest data are presented in Table 2.

Table 2. Frequency Distribution of Pretest Data Students' critical thinking skills

Experiment Class			**Control Class**		
Score	**Frequency**	**Relative Frequency (%)**	**Score**	**Frequency**	**Relative Frequency (%)**
32 – 38	4	20%	20 – 28	3	16%
39 – 45	3	15%	29 – 37	9	47%
46 – 52	5	25%	38 – 46	5	26%
53 – 59	2	10%	47 – 55	0	0

60 – 66	5	25%	56 – 61	2	11%
67 - 73	1	5%		**19**	
Total	**20**	**100**			
Average		**50,20**	**Average**	**37,4,7**	

Pretest Data Normality Test

Table 3. Normality Test Results Pretest Data Students' critical thinking skills

Tests of Normality							
	Class	Kolmogorov-Smirnova			Shapiro-Wilk		
		Statistics	df	Sig.	Statistics	df	Sig.
Pretest	Experiment	,107	20	,200*	,958	20	,502
	Control	,194	19	0.059	,915	19	,091
*. This is a lower bound of the true significance.							
a. Lilliefors Significance Correction							

From the results of the normality test, it can be concluded that the two samples are normally distributed. The normal distribution graph for the two sample classes can be seen in Figure 1.

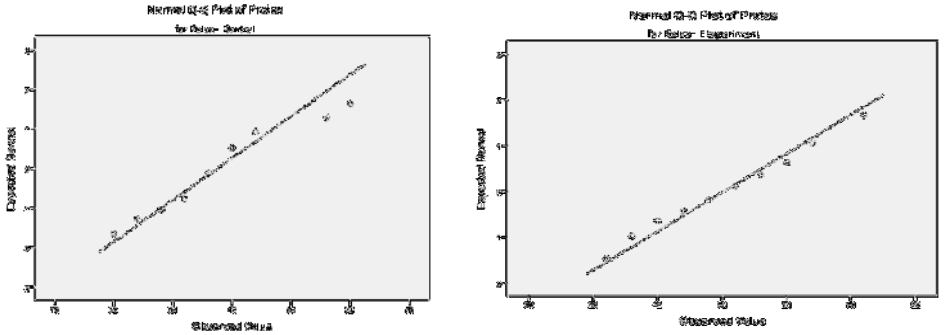

Figure 1. Normal Distribution of Pretest Data

Based on Table 3 and Figure 1 it can be concluded that both classes come from a normally distributed population

Pretest Data Homogeneity Test

Based on the results of the Levene Test (Fcount) for the pretest was 2.587 with a significance of 0.116. These results indicate that the significance value is greater than the 0.05 level of significance. So it can be concluded that the experimental class and control class come from populations that have the same variance or the two classes are homogeneous. All prerequisite tests are met, then this research can be calculated parametrically.

Data Description Science process skills

Science process skills in this study are moderating variables, meaning they can influence and strengthen the relationship between independent and dependent variables.

Table 4. Science Process Skills Data

Experiment Class			Control Class		
Score	**Frequency**	**Relative Frequency (%)**	**Score**	**Frequency**	**Relative Frequency (%)**
55 – 62	5	25%	**55 – 62**	0	0%
63 – 70	6	30%	**63 – 70**	0	0%
71- 79	2	10%	**71- 79**	7	37%
80 – 87	4	20%	**80 – 87**	9	47%
88 – 94	3	15%	**88 – 94**	3	16%
95 - 100	0	0	**95 - 100**	0	0%
Total	**20**	**100%**	**Total**	**19**	**100%**
Average	**74**		**Average**	**82**	

From the grouping by class in Table 4 it is known that the average science process skills of students in the experimental class is 74 while the average science process skills of students in the control class is 82.

Table 5. Grouping of Students Based on the Level of Science Process Skills

Motivation Level	N	Lowest Score	Highest Score	Average Score	Standard Deviation
Tall	12	78.67	95.33	84.82	4.9159
Low	17	54.67	77.33	68.39	6.52

Based on Table 5. above, it can be described that students with

high science process skills from both the experimental class and control class, amounted to 12 people, while in the low science process skill group, both from the experimental class and control class, there were 17 people. The average high science process skill is 84.82, and the low science process skill average is 68.39.

Description of Data Posttest Students' critical thinking skills

More clearly the presentation of posttest data for the two classes can be seen in Table 6.

Table 6. Table of Frequency Distribution of Posttest Data Students' critical thinking skills

Experiment Class			Control Class		
Score	**Frequency**	**Relative Frequency (%)**	**Score**	**Frequency**	**Relative Frequency (%)**
57 – 65	5	25%	32 – 40	6	32%
66 – 74	4	20%	41 - 49	4	21%
75 – 83	8	40%	50 – 58	4	21%
84 – 92	2	10%	59 – 67	4	21%
93 - 100	1	5%	68 - 76	1	5%
Total	**20**	**100%**	**Total**	**19**	**100%**
Average	**78.4**		**Average**	**58.5**	

Based on the average scores obtained by students in both classes, it can be concluded that the results obtained by students in the experimental class, namely those taught by the Inquiry Learning Model were better than the results obtained by the control class students, namely those taught by the direct learning model. This is due to the difference in the treatment given to the two classes. In the experimental class students are more active in problem finding activities so that learning materials last longer in students' memories. while in the control class students tend to be passive so they easily forget the material they have just learned.

Posttest Data Normality Test

Table 7. Posttest Data Normality Test Results Students' critical thinking skills

Class	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistics	df	Sig.	Statistics	df	Sig.
Experiment Posts	,155	20	,200*	,957	20	,482
Control Posts	,108	19	,200*	,958	19	,531

This result is greater than the significance level value of 0.05, so it can be concluded that the posttest data in the experimental class and control class have data that is normally distributed. From the results of the normality test, it can be concluded that the two samples are normally distributed.

Posttest Data Homogeneity Test

Based on the results of the Levene Test (Fcount) for the post-test, it was 1.362 with a significance of 0.251. These results indicate that the significance value is greater than the 0.05 level of significance. So it can be concluded that the experimental class and control class come from populations that have the same variance or the two classes are homogeneous. All prerequisite tests are met, then this research can be calculated parametrically.

Research Result Data Analysis

Data from the results of research that has been done, then analyzed as follows.

Pretest and Posttest Data Analysis Students' critical thinking skills

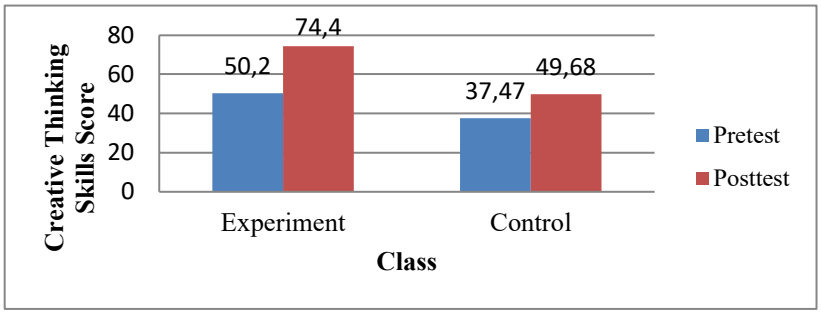

Figure 2. Comparison of Pretest-Post Test Data for Experiment Class and Control Class

Based on these data, it can be concluded that the improvement of students' critical thinking skills taught by the inquiry learning model is better than the control class taught by the direct learning model.

Table 8. Gain Value

Class	Average Gain Value	Category
Experiment	0.47	Currently
Control	0.17	Low

The results of the calculation of the gain value indicate that the improvement in critical thinking skills of students in the experimental class is better than that of students in the control class. This means that the treatment given to the experimental class was able to improve students' critical thinking skills better than the treatment in the control class.

Data Analysis Students' critical thinking skills based on the level of science process skills

Table 9. Grouping of Students' Critical Thinking Skills Based on Science Process Skills

	N	Lowest Score	Highest Score	Average Score	Standard Deviation
Tall	12	78.67	95.33	84.82	4.91
Low	17	54.67	77.33	68.39	6.52

This is the initial conclusion that the learning model used in the classroom, either directly or indirectly, has an important role in students' critical thinking skills and students' science process skills.

Test Requirements Analysis

Normality Test

Table 10. Data Gain Normality Test Results Students' critical thinking skills

Tests of Normality							
	Class	Kolmogorov-Smirnova			Shapiro-Wilk		
		Statistics	df	Sig.	Statistics	df	Sig.
gain	Experiment	,117	20	,200*	,973	20	,824
	Control	,126	19	,200*	,974	19	,845
*. This is a lower bound of the true significance.							
a. Lilliefors Significance Correction							

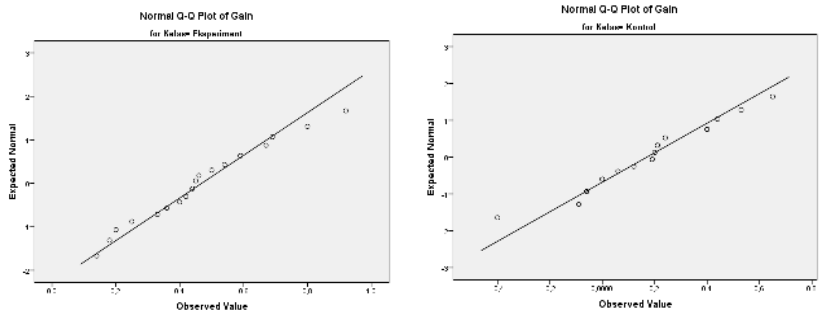

Figure 3. Normal Distribution of Gain Data

it can be concluded that both classes come from a normally distributed population.

Homogeneity Test

The results of the homogeneity test using Levene's test have a significant value of 0.472. These results indicate that the significance value of the data gain is greater than the 0.05 level of significance. The results of the Levene Test (Fcount) for the pretest with a significance of

0.528. So it can be concluded that the gain data from the experimental class and control class come from populations that have the same variance or the data from the two classes is homogeneous. All prerequisite tests are met, then hypothesis testing can then be carried out.

2. Discussion

The Effect of Application of Inquiry Model Learning and Direct Learning on Critical Thinking Skills

The results of the research findings calculated using the SPSS Anova 2-way application obtained a class significance value of 0.000. Because the value of sig. 0.000 < 0.05 so that the results of hypothesis testing reject H_0 or accept Ha in the 5% alpha level, it means that there are differences in students' critical thinking skills taught by the inquiry learning model and the direct learning model. There is a difference between the critical thinking skills of students who are taught with the inquiry learning model and students who are taught using the direct learning model. The score obtained by students who were taught using the Inquiry Learning Model was 24.2 higher than the score obtained by students taught by the direct learning model, which was 12.21. So it can be concluded that the inquiry learning model affects students' critical thinking skills better than the Inquiry Learning Model. direct learning model.

Meanwhile, in the group of students who were taught with the direct learning model during the learning process students were more silent by only listening and paying attention to the explanation given by the teacher. Learning activities are dominated by teacher activities in delivering material. Students are less involved in finding a concept, but

the teacher is the source of learning. Experimental activities are dominated by teachers and students pay more attention than do so that it affects the length of time that knowledge is stored in students' memory. Students ask the teacher for material more directly and have less effective discussions with their group mates.

Based on the findings obtained and the existing theory, it shows that the inquiry learning model has a better influence on students' critical thinking skills than the direct learning model.

Differences in critical thinking skills of students with high science process skills and low science process skills

Data on students' science process skills were obtained from the results of student observation sheet questionnaires before the learning meeting. The results of hypothesis testing using two-way ANOVA for the second hypothesis obtained a probability or significance value of 0.034 <0.05. This shows that there is a significant difference between the critical thinking skills of students who have high science process skills and students who have low science process skills. From the results of hypothesis testing and the average value of the post-test of students' critical thinking skills based on the level of science process skills, it can be concluded that the critical thinking skills of students who have high science process skills are better than students who have low science process skills.

The Interaction Between Learning Models and Science Process Skills on Students' Critical Thinking Skills

The results of hypothesis testing using two-way ANOVA for the third hypothesis between the inquiry learning model and direct learning

with science process skills on students' critical thinking skills (Class*KPS) obtained a probability or significance value of 0.019<0.05. Because the significance value is 0.019 <0.05, the alternative hypothesis is accepted, which means that there is an interaction between the two learning models and the level of science process skills in influencing students' critical thinking skills. The results of this study are supported by the results of previous research that has been carried out by Gorat, Retno and Saronom (2019) in developing an inquiry-based practical guide to improving scientific attitudes and science process skills,

Based on the description above, it can be understood that there is an interaction between the learning model and the level of science process skills on students' critical thinking skills.

D. Conclusion

The conclusions of this research are as follows:

1. Ability students' critical thinking taught by the Inquiry learning model is better than students taught by the direct learning model (sig. = 0.000 < 0.05). Thus, students who are taught with the inquiry learning model get a higher critical thinking ability score than students who are taught with the direct learning model. This is shown from the research data, namely the average gain value of students taught by the inquiry learning model is 0.47 while the average gain value of students taught by direct learning model is 0.17.
2. Ability critical thinking students who have high Science Process Skills are better than students who have low Science Process Skills (sig.=0.034<0.05). Thus, students who have high Science Process Skills get a higher critical thinking ability score compared to students who have low Science Process Skills. This is shown from the research data,

namely the group of students who have high Science Process Skills obtained an average critical thinking ability score of 0.40 while the group of students who have low Science Process Skills obtained an average critical thinking ability score of 0.27.

3. There is an interaction between the two learning models with the level of Science Process Skills in influencing students' critical thinking skills (sig. = 0.019 < 0.05). Learning models and Science Process Skills influence each other to improve students' critical thinking skills. The average critical thinking ability who has high Science Process Skills in students who are taught with the Inquiry learning model is 0.409 while the students who are taught using the direct learning model are 0.198. The average critical thinking ability that has low motivation in students who are taught by the inquiry learning model is 0.502 while those taught by the direct learning model are 0.06.

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