LEARNING OF SCIENCE WITH INQUIRY LEARNING MODELS WITH PICTORIAL RIDDLE THE RELATIONSHIP WITH THE CRITICAL THINKING SKILLS OF SMP STUDENTS

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Abstract
The inquiry learning model is a learning model that encourages student activity in learning activities. This inquiry learning model is accompanied by one of the learning media namely pictorial riddle in the form of puzzle images. This study aims to examine the effect of science learning with inquiry learning models accompanied by pictorial riddle relation to critical thinking skills of junior high school students. This type of research is an experiment using a pre-test post-test control group design. The study population was Grade VII students of SMP Negeri 1 Ambulu, sampling using a homogeneity test. The data analysis technique uses an Independent samples t-test. The results of the Kolmogorov Smirnov normality test showed that both samples were normally distributed, so the hypothesis test uses a parametric statistical test called the Independent Sample T-test. Based on the results of the Independent Sample T-test, there is a significant influence on the results of critical thinking skills.

Keywords: *Pictorial riddle, critical thinking skills, pre-test post-test control group design*

PRELIMINARY

Learning based on current reality is not only a few are still fixed on the teacher, students only accept material delivered by the teacher and are required to memorize formulas. This is by the presentation (Rangkuti & Ridwan, 2018)which revealed that in general in the classroom the ability of students is directed to memorize, remember and hoard information. Besides, according to(Sulthon, 2016) that a common problem in junior high school, many students lack interest in learning science, this is because it has concepts that are difficult to understand, and has many formulas that need to be memorized.

Science learning is the same as other learning. Science learning in understanding a material through experiments, observations or experiments. Besides, that student is also trained in creativity and scientific attitude well, not only memorizing formulas and only listening to explanations from the teacher(Sulthon, 2016). Science learning has a goal to assist students in getting ideas, understanding, experience, skills, and abilities to think scientifically and be able to apply in everyday life (Budiastra, et al., 2019). A study

conducted by a Wahyuni, et al., (2018) explained the learning of science also has a goal so that students can master the concepts and principles of science to develop skills, knowledge, and confidence.

Besides, the learning objectives also foster thinking skills in students, especially critical thinking skills (Susillo, 2012). Critical thinking is a process of high-level thinking in the formation of conceptual systems in students, and can also be developed by providing meaningful experiences (Neolaka, 2019). Critical thinking skills are a process in the cognitive domain as a thinking guide that uses an assessment of context, application, synthesis, and various information obtained based on observation, thought or communication (Jatmiko, et al., 2016), and must be trained through the learning process because these skills are not inherent in themselves from an early age (Rahmawati, et al., 2016). Thus, one of the lessons that can help students to master concepts and improve students' critical thinking skills is the inquiry learning model(Kurniawati, et. Al., 2014).

The inquiry learning model is a series of learning activities that emphasize the activeness

of students in finding concepts based on the given problem (Suhada, H., 2017) and emphasizes critical and analytical thought processes. This is consistent with research conducted byIsrawani, (2015) inquiry learning model is a series of learning process activities that emphasize critical and analytical thinking in searching and finding answers on the questions in question. According to M. Putri, et al., (2015) states that the inquiry learning model is a learning model that engages students in the learning process so that students are active and also requires students to process messages that will later provide knowledge, skills, and values.

The advantages of inquiry learning models are: 1) learning is more emphasized in the development of various aspects namely affective, psychomotor, cognitive aspects that are balanced so that the learning process is more meaningful, 2) great opportunities in providing space for students to learn with their learning styles, 3) this learning model is by the development of psychology in modern learning today, and 4) this learning model is very good for the needs of students who have abilities above average or who are weak in learning (Al-Tabany, 2014). In addition to having advantages, this learning model also has weaknesses, namely: 1) difficulty in controlling student learning activities and student success, 2) this learning model requires a lot of time, so it is often difficult for teachers to adjust the time specified, and 3) difficulty planning specific learning with student learning habits (Al-Tabany, 2014).

In this inquiry learning model can be combined with visual media. Visual media is a media that can only be seen by the eye so that it only relies on the means of the sense of sight in understanding information as a whole(Yusmiono, 2018). The media used in this study is Pictorial Riddle learning media. This is consistent with research conducted by*Purwanto and Binti, (2014)* state that the inquiry learning process can be carried out using pictorial riddle. Pictorial riddle is a picture that is able to motivate students' interest in learning in groups (Lutfiati and Woro, 2017). Riddle in the form of a picture either on a poster board, blackboard, or projected transparently (Susilawati, et al., 2013).

Based on the description above, the need for research entitled "Science Learning With Inquiry Models Accompanied by Pictorial Riddle Related to Critical Thinking Skills in Middle School Students". The purpose of this study was to examine the effect of science learning with inquiry learning models accompanied by pictorial riddle relation to critical thinking skills of junior high school students.

RESEARCH METHODS

This research was conducted at SMP Negeri 1 Ambulu Jember, in the even semester of the 2019/2020 school year, the material used was environmental pollution. This study uses an experimental design with pre-test post-test control group design, as shown below:

Table 1 *Pre-test post-test control group design*

Random	Group	Pre-test	Treatment	Post-test
R	E (Experiment)	O1	X	O2
	K (Control)	O3	-	O4

Information:
R   = Randomization
X   = Treatment using the inquiry learning model is accompanied *pictorial riddle*
-       = There is no treatment
O1   = Experimental group given *pre-test*
O3   = Control group given *pre-test*
O2   = Experimental group given *post-test*
O4   = Control group given *post-test*
(Yusuf, 2014)

The population in this study were all grade VII students of SMP Negeri 1 Ambulu Jember. The sampling technique uses a homogeneity test with a purposive sampling area method, a deliberately determined sample that has the same initial ability, not based on strata or religion (Hanifah, 2016). The class selected as a sample is class VII A as an experimental class and class VII E as a control class. In the experimental class given treatment or treatment in the form of inquiry learning models accompanied by a pictorial riddle, while in the control class not given treatment that is using the learning model commonly used by teachers when teaching. This research was conducted with environmental pollution material.

Data collection using a written test in the form of pre-test and post-test compiled refers to indicators of critical thinking skills. Critical thinking skills assessment scores refer to the

rubric of critical thinking skills then calculated using the formula below:

$$PK = \frac{JS}{JM} \times 100 \text{ (Arikunto, 2003)}$$

Information:

PK = Description of critical thinking
JS = Total number of students' scores
JM = Maximum total score

Then the normality test is done using the Kolmogorov Smirnov test with the application of SPSS 20. In the Kolmogorov Smirnov test if the value is asymp. Sig (p)> α then the data distribution has a normal distribution(As'ari, 2018). After knowing the sample data is normally distributed then the hypothesis test is then performed using the parametric statistical test that is the independent samples t-test.

RESULTS AND DISCUSSION
Result

The first step is to test homogeneity in all populations. Homogeneity test uses daily test scores on the previous material, it functions to test the ability of VII grade students of SMP Negeri 1 Ambulu to be homogeneous or heterogeneous. The data is carried out statistical tests namely One Way Anova test. In the homogeneity test results can be seen in the table below, namely:

Table 3.1 Homogeneity Test

Levene Statistics	df1	df2	Sig.
1,364	9	309	, 204

Based on the SPSS homogeneity test, it can be seen that the Sig value shows a value of 0.204 with a significance value of 0.05, which means a value of 0.204> 0.05 where grade VII students at SMP Negeri 1 Ambulu have homogeneous abilities. After knowing that all populations are homogeneous, the researchers chose 2 classes. The two classes are divided into 2 namely 1 class for the experimental class and 1 class for the randomly selected control class. The results were selected class VII A as an experimental class and class VII E as a control class.

The results of the pre-test and post-test critical thinking skills in the experimental class and the control class. The average pre-test results of the experimental class were 62.45 and the control class was 45.33 while the average results of the post-test experimental class were 74.00 and the control class was 52.39. Improvement of the pre-test results to the post-test experimental class is greater than the control class. The average results can be seen more clearly in the graph below:
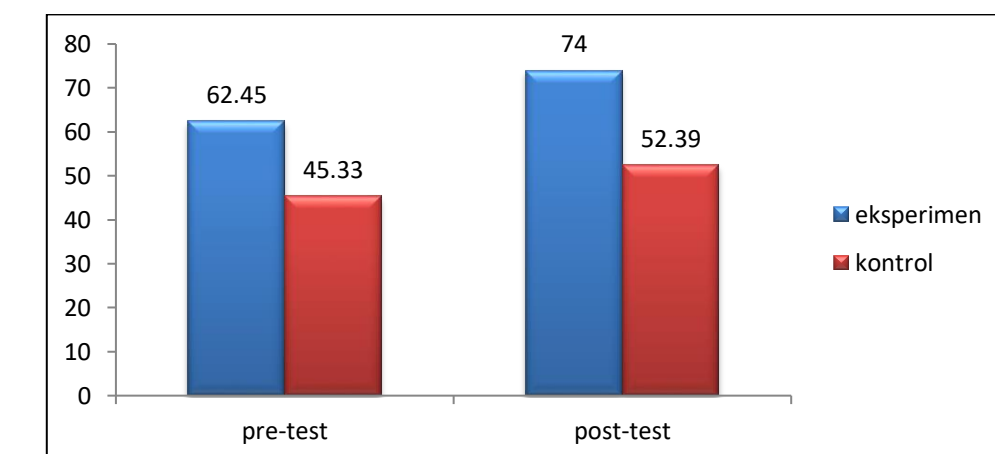

Figure 3.1 Graph of pre-test and post-test averages

The picture above shows that the difference between the pre-test and post-test values of the experimental class was 11.55 while the control class the difference between the pre-test and post-test values was 7.60. The experimental class using the inquiry learning model accompanied by pictorial riddle was higher than the control class.

The next step is to conduct a normality test to find out whether the data of both samples are

normally distributed or not. The normality test uses the Kolmogorov Smirnov one sample test with a significance level of 0.05. If it is normally distributed, then it uses the parametric statistical test, namely the independent samples t-test. The results of the normality test can be seen in the table below:

Table 3.3 Results of the Kolmogorov smirnov normality test

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		128
Normal Parametersa, b	The mean	0E-7
	Std. Deviation	1.02143179
Most Extreme Differences	Absolute	, 072
	Positive	, 072
	Negative	-, 055
Kolmogorov-Smirnov Z		, 811
Asymp. Sig. (2-tailed)		, 526

a. Test distribution is Normal.

b. Calculated from data.

Based on the Kolmogorov Smirnov normality test table on the Asymp value. Sig (2-tailed) shows a value of 0.526> 0.05, which means that the normality test results have a value greater than the significance level. If the Asymp value. Sig (2-tailed) is greater than 0.05, so the two research samples are normally distributed, so the next step can use the parametric statistical test, the independent sample t-test.

The Independent sample t-test is used in this study to find out how the differences in the two samples are the experimental class and the control class after the learning process. The output results in the independent sample t-test can be seen in the table below:

Table 3.4 independent sample t test results

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Ngain_score	Equal variances assumed	1,540	, 219	4,319	62	, 000	, 27882	, 06456	, 14977	, 40788
	Equal variances not assumed			4,319	61,789	, 000	, 27882	, 06456	, 14976	, 40789

Based on table 4.4 the results of the independent sample t-test can be seen in Levene's test for equality column Sig values indicate a value of 0.219> 0.05. This value includes the value of variance which means that the experimental class and control class data are homogeneous. If the data is homogeneous, the interpretation of the results of the independent sample t-test is guided by the equal variances assumed table column. The value shown in the equal variances column is assumed to be part of the sig (2-tailed) value of 0,000 <0.05 so H0 is rejected and H1 is accepted. The statement shows that there is an influence on the results of critical thinking skills between the experimental class students and the control class.

Discussion

This research was conducted at Ambulu 1 Junior High School in class VII with environmental pollution material. Before learning activities begin, each class is given written test questions in the form of a pre-test that refers to indicators of critical thinking to determine the initial abilities of students at SMP Negeri 1 Ambulu. Based on the research results, it is known that the maximum pre-test value in the experimental class is 85 with an average of 62.45 and a control class of 69 with an average of 45.33. In the initial ability, the experimental class is superior to the control class.

The next step was to conduct learning activities in the experimental class and the control class for 3 meetings. The difference between the experimental class and the control class that is in the experimental class is given treatment using the inquiry learning model accompanied by pictorial riddle with learning activities in discussion while in the control class using the learning model commonly used by the teacher is a learning model that is still centered on the teacher with the lecture method from the teacher.

In the final stage, students are given test questions in the form of a post-test by referring to indicators of critical thinking in the experimental class and the control class. Based on the research results it is known that the highest post-test value in the experimental class was 92 with an average of 74.00 and the control class was 73 with an average of 52.39. The pre-test and post-test results show that the experimental class has higher critical thinking skills than the control class.

The results of the study were then tested for normality using the Kolmogorov Smirnov test. SPSS output of the Kolmogorov Smirnov normality test produced Asymp value. Sig (2-tailed) is 0.526> 0.05, indicating that both samples are normally distributed, therefore data analysis can use the parametric statistical test that is the independent sample t-test. Based on the results of the independent sample test t-test shows the sig (2-tailed) value of 0,000 <0.05 which shows that H0 is rejected and H1 is accepted. It can be seen that there is a significant influence on the results of critical thinking skills using inquiry learning models accompanied by the pictorial riddle.

The inquiry learning model accompanied by pictorial riddle helps the student learning process in finding new knowledge in groups. This statement is by research conducted by Rangkuti, (2018), which states that the inquiry learning model can make students interested and more active in learning to find new knowledge, rather than using a teacher-centered learning model. Besides that, with the addition of pictorial riddle, students can exchange opinions in discussing problem-solving. Other suitable research results were conducted by Purwanto and Binti, (2014)He stated that the inquiry learning model pictorial riddle type was effective to improve students' critical thinking skills. The results of the research conducted bySurtriyanti, et al., (2017) which explained that science learning accompanied by pictorial riddle method can improve students' critical thinking skills in both high and low groups.

CONCLUSION

Based on the results of data analysis and discussion it can be concluded that there is an influence on learning science with inquiry models accompanied by pictorial riddle related to critical thinking skills in junior high school students. This is evidenced in the results of the independent sample t-test, which shows a sig (2-tailed) value of 0,000 < 0.05 which means that H0 is rejected and H1 is accepted. It was also recorded on the results of the average value of the pre-test and post-test experimental and control classes.

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