

**THE STUDENTS' CRITICAL THINKING SKILLS ON SCIENCE  
LEARNING SUBJECT AT 5<sup>TH</sup> GRADE IN INQUIRY LEARNING**

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**Abstract:** This study aims to determine the differences in students' critical thinking skills using inquiry learning model. The methods that used in this research is experimental design with Nonequivalent Control Group Design (pre-test and post test in experimental group and control group). The samples are taken using simple random sampling technique with 5<sup>th</sup> grade of A class (30) and B class (31). This study using test and documentation as the data collection techniques which will be processed to answer the specified hypothesis. The technique of data analysis using t-test result of critical thinking skills in experimental group and control group with level of 0,05 are a proved result of hypothesis-table  $\leq t_{table} \geq t_{table}$  that is  $-2,001 \leq 4,096 \geq 2,001$  then  $H_a$  is accepted, means that both group are not the same. This indicates that there is a differences of students' critical thinking skills between students using inquiry models with students using conventional learning model (lectures and assignment). It can be concluded that the inquiry self-learning models can influence the students' critical thinking skills with the percentage score of the critical thinking skills are 55% in the experimental group and the control group are 27%. Based on the results of these research, the suggestions that researchers can convey that inquiry learning models can be used as an alternative in science learning.

**Keywords:** Inquiry Learning Model, Critical Thinking Skill

## A. Introduction

All aspects of life require an effective function of critical thinking skills which are very basic abilities that are closely attached to life and work. Lestari (2016) states that thinking is a person's psychological process to solve problems or to achieve certain goals that connect the ideas and facts. To be able to process the important information for life, it takes the ability to be able to sort out information or criticize it, Hendracipta and Nulhakim (2017) suggests that the critical thinking is an activity through ways of thinking about ideas or thought that related to the concepts given or problems presented. Critical thinking is a process of intellectual thinking (Ahmatika, 2016). This thinking process is related to the process of analyzing, identifying an idea specifically and being able to separate and differentiate, the elements that contained in it sharply. This is in line with the opinion expressed by Azizah (2018) which explains the critical thinking skills is a cognitive process of students in systematically analyzing and specific problems encountered, differentiate he problems carefully and thoroughly, identifying and reviewing information to plan the problem solving strategies. Critical thinking skills is a competency that must be possessed by students. According to Sudiarta's

expression (in Ristiasari, 2012) critical thinking has been proven to prepare students in thinking on the various disciplines. Critical thinking is a cognitive activity that conducted by students by dividing ways of thinking in real activities, by focusing on making decisions about what is believed or done. Critical thinking skills are used to solve the everyday problems (Prihartini, 2015).

According to Slavin (2011) one of the main goals of attending school is to form the critical thinking skills. Critical thinking skills is the ability to express opinions in organized manner by thinking to be able to solve problems by identifying and analyzing the information that have obtained. Critical thinking is one of the goals in education.

Bilqis (2016) states that the fundamental thing in establishing the quality of human resources is through education, so the changes in the education system are needed in accordance with the demands of the times. Annuru, Johan, and Ali (2017) state that entering the century of knowledge, which is the 21st Century, Human Resources are required to have several abilities. The 21st century is a century that happen today, it demanding human resources to have the ability to think at a high level. Daryanto and Syaiful (2017) state that the ability to

think critically, solve problems, and collaborate is a must-have capability in this 21st century. It can be concluded that critical thinking skills are the important competencies that human resources must possess. The education in the 21st century, as Marwah, Wahyudin, and Johan (2017) suggest that education should lead to processes that can form students to face the era of globalization, environmental problems, advances in information technology, convergence of science and technology, knowledge-based economics, the rise of creative and cultural industries, the shift in world economic power, and the influence and impact of science-based technology. So, education has an important role in formation the next generation of the nation.

Curriculum 2013 is a continuation of the Education Unit Level Curriculum (KTSP) in 2006, which covers the three area, affective, cognitive and psychomotor. Rosidah (2017) states that students are the subjects of education who have the active potential to be able to find, discover, construct, process, and use their knowledge. So in the 2013 curriculum learning, all teachers must be able to empower all aspects of the students to be involved in learning. Nahdi (2015) revealed that students as learners are stimulated through the learning activities to be able to build

their knowledge through the active learning process that they done themselves. Through classroom learning, the teachers must be able to determine everything that is able to stimulate students to be active in learning.

In the renewal of the 2013 curriculum, it is expected to create students who are independent, active, creative, innovative, and master in technology. The Elements of change in this curriculum have been adapted to the demands of the era that are developing at this time. Curriculum 2013 is a character-based curriculum by implementing the integrated learning. Trianto (2015) suggests that teaching in integrated learning are chooses the several subjects or related learning materials. In its application, integrated learning combines the several interrelated subjects into themes, so the meaningful experiences are remembered in the students' mind and able to develop their thinking abilities.

Basically, elementary school students have high curiosity, based on the opinion expressed by Hidayati (2017) elementary school students are students who still need great attention and very high curiosity, so it can become a place for teachers to be able to develop themselves. This is done by exploring their abilities by trying to train high-level thinking skills in elementary school

students including critical thinking skills.

One of the contents that contained in the theme of high class especially in 5<sup>th</sup> grade is Sciences (IPA). Science is one of the contents of lesson that must be given and taught to students at all levels of school. This is because science is an important lesson that students will meet in their daily lives. Science learns various knowledge and fact about nature that are factual.

Rahmasari (2016) argues that science learning requires students' process skills to understand in detail, because science learning is a learning that connects the environment around students with existing material. So in the learning process, a process is needed to find out for yourself and construct the knowledge that they have. Widiana (2016) argues that science is essentially a product, where as a product, process and

application. A collection of knowledge and a set of concepts and chart concepts are the essence of Science as a product. Science as a process are used to study the object study, find and build scientific products, and as an application, the theories of science will produce technology that can make life easier.

Another factor is from students who influence learning activities in optimizing the expected way of students' thinking. The environmental factors are also contribute to this and less variety of learning, with the teacher-centred learning, where the teacher becomes the centre of learning so students do not participate in it. Usmaedi (2017) argues that ideally, students are placed as the subjects of active learning, not passive learning objects.

## **B. Research Methodology**

Research design is a plan that made to implement the research activities. Quantitative is applied as an approach in this research. Sugiyono (2015) argues that the experimental research method is a method that is done to find the effect of certain treatments on others with the conditions that can be controlled. The quasi-experimental model, which is

precisely non-equivalent control group design was used in this research.

Population is all objects/subjects in the generalization area that have the certain qualities and characteristics. All 5<sup>th</sup> grade students in SD Negeri Pedurungan Lor 01 Semarang with the total of 72 students became the population in this research. The research

samples were obtained by using the Probability Sampling technique, precisely Simple Random Sampling. Determination the amount of samples are calculated as follows:

$$n = \frac{N}{1 + N (e)^2}$$

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Information:

n = The number of Sampel

N = The number of Population

e<sup>2</sup> = Factual level or error limit (5%)

$$n = \frac{72}{1 + 72 (0,05)^2}$$

$$= \frac{72}{1 + 72 (0,0025)}$$

$$= \frac{72}{1 + 0,18}$$

$$= 61,02 \text{ are rounded to } 61$$

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The analysis data activities according to Sugiyono (2015) are grouping the data based on variables and types of respondents, tabulating data based on variables from all respondents, presenting data on each variable carefully, performing calculations to answer the formulation problem, and calculating to test the hypothesis that has been proposed.

The score data was obtained from two groups, which were used as the sample of this research. The post-test score of students' critical thinking skills are processed to analyze the final data in this study. The final data analysis is done by testing the hypothesis after the samples are given the different treatment. The final data analysis are in the form of normality test, homogeneity test and hypothesis test.

The hypothesis test in this study is a difference test of T-test is done to find out the differences between the critical thinking skills of the experimental group students and the control group students. From the results of these data, it is known that the distribution of data is normally distributed and has a homogeneous variance, so T-tests on both parties can be done. Determines the score of T-count, can be calculated by this formula:

$$t_{hitung} = \frac{\bar{X}_1 - \bar{X}_2}{S_{gabungan} \sqrt{\frac{n_1 + n_2}{n_1 \cdot n_2}}}$$

with:

$$S_{gabungan} = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}}$$

Information:

t : Significant score that been sought

$\bar{x}_1$ : Average score of experimental group

$\bar{x}_2$ : Average score of control group

S : Combination of standard deviation

$S_1^2$  : Variance of experimental group  
 $S_2^2$  : Variance of control group  
 $n_1$  : Amount of students in experimental group sample  
 $n_2$  : Amount of students in control group sample

The criteria for testing hypotheses:  $H_0$  are accepted if  $-t_{table} \leq t_{count} \leq t_{table}$ , with a significant level of 5% and  $dk = 2$ . In other situation  $H_0$  is denied. (Sundayana, 2015).

### C. Research Results and Discussions

The results of research data analysis that has been done in SD Negeri Pedurungan Lor 01 Semarang in the second semester of 5<sup>th</sup> grade, with the water cycle material which include the score of critical thinking skills test in the experimental group and control group, using learning models in each groups. The experimental group was treated with the inquiry learning model and the control group was given a treatment by

conventional learning models (lectures and assignments). From the results of retrieval data, the initial data analysis was done by conducting the normality tests and homogeneity tests, and final data by conducting the normality tests, homogeneity tests and hypothesis test.

The data on critical thinking skills were obtained from written tests of descriptions with 6 indicators. From the test, it were obtained the following data::

**Table 1. The Indicators of Critical Thinking Skills Achievement**

Indicators	Number of Question	Score		Achievement Score		Percentages	
		CG	EG	C	EG	C	EG
1. Focus	1	64	75	90	93	71%	81%
2. Analyze	8	28	37	90	93	31%	40%
3. Consider	2 & 3	93	120	180	186	52%	65%
4. Induce	7	44	59	90	93	49%	63%
5. Define	4,5 & 6	168	182	270	279	62%	65%
6. Interact	9 & 10	86	118	180	186	48%	63%
<b>Average</b>				150	155	52%	63%

Based on table 1, the results of the data calculation, can be concluded that

there are differences in critical thinking skills of the experimental

group with the control group, that is the difference for indicator 1 by 10%, indicator 2 by 9%, indicator 3 by 13%, indicator 4 by 14%, indicator 5 by 3% and indicator 6 by 15%. The average differences between the experimental group and the control group is 11%.

The calculation of hypothesis test using the final data recapitulation of the critical thinking skills tests of experimental group which is treated by inquiry learning models and control group treated by conventional models. The calculation results can be seen as follows.

**Table 2. Hypothesis Test**

Criteria of Data	T-test	
	Experimental	Control
Amount of Students	31	30
Average Score	63,710	54,367
Simbak	7,582	10,101
$S_{pooled}$	8,909	
$T_{count}$	4,096	
$t_{table}$	2,001	

From the results of T-test on table 2, the score of  $S_{pooled} = 8,909$ ,  $t_{count} = 4,096$ , and  $t_{table} = 2,001$  with a significant level of distribution of 0.05 is 2.001. In the calculation of the hypothesis  $H_0$  is rejected and  $H_a$  is accepted, because  $-t_{table} \leq t_{count} \geq t_{table}$  which are  $-2,001 \leq 4,096 \geq 2,001$ . Thus, can be concluded that the critical thinking skills students using inquiry learning models are better than conventional models.

From the results of data analysis, the research shows that the inquiry learning model are influences the critical thinking skills of 5th grade students in SD Negeri Pedurungan Lor 01 Semarang compared to conventional learning models (lectures and The critical thinking skills using inquiry learning models has a significant difference with critical thinking skills using conventional

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learning models (lectures and assignments), this are proved by testing hypotheses with t-test of two samples with testing criteria if  $-t_{table} \leq t_{count} \geq t_{table}$  which are  $-2,001 \leq 4,096 \geq 2,001$  then  $H_0$  are denied,  $H_a$  are accepted. It means that there are differences in students' critical thinking skills or there is the influences of inquiry learning models on students' critical thinking skills. The average score that obtained in the group that using inquiry learning model are amounted to 63.710 (17 students completed and 14 students did not complete). Whereas in the control group that uses conventional learning models (lectures and assignments), the average score that obtained is 54.367. The average of differences between the two groups are 9.347. The indicators of critical thinking skills that can be

Jupriyanto & Sari

achieved in the experimental group is 63% and the control group is 52% with the differences between the two groups by 11%. It can be concluded that the inquiry learning model can influence students' critical thinking skills in science.

Inquiry learning model is a series of activities in seeking and emphasizing the answers to a problem that asked through a critical and analytical thinking process by involving the surrounding environment. Through question and answer between teacher and student is the process of thinking itself. Critical thinking is an ability that related to analyzing something, such as the opinion expressed by Fakriyah (2014) critical thinking skills related to the ability to identify, analyze, solve problems creatively and think logically, so it produce the right considerations and decisions. The relations between critical thinking skills and inquiry learning models are in accordance with Piaget's theory. His theory provides a lot of main

concepts to develop the appropriately ability by involving the environment.

Therefore, a good learning must inspire students' active participation directly and facilitate students, so the students are encouraged to be active and to able to think optimally during learning activities. According to Gulo (in Ambarsari, 2013) states that inquiry is a series of learning activities that involve maximally all students' ability to search and investigate systematically, critically, logically, analytically, so they can formulate their own findings confidently. Science is one of the most important lessons, according to Rusnadi (in Laksana, 2016) states that science makes the students able to be scientific in solving problems that faced. So in it can be developed the critical thinking skills. The use if inquiry learning model is one of the learning models that can be applied in Science to influence the students, so they can think critically than using the conventional learning models (lectures and assignments).

#### **D. Conclusions**

Based on the results of the analysis, data testing, and the discussion that related to the influence of the inquiry learning model on students' critical thinking skills in Science subjects in the 5<sup>th</sup> grade of SD Negeri Pedurungan Lor

01 Semarang are said to be influential. Can be proven from the results of T-test, indicating that the results of critical thinking skills are better using inquiry learning models rather than using conventional models.



This is seen from  $-\text{t}_{\text{table}} \leq \text{t}_{\text{count}} \leq \text{t}_{\text{table}}$  which are  $-2,001 \leq 4,096 \leq 2,001$  then  $H_0$  are denied,  $H_a$  are accepted. The indicators of critical thinking ability that can be achieved in the experimental group is 63% and the control group is

52% with the differences between the two groups by 11%. It can be concluded that the inquiry learning model can affect students' critical thinking skills in Science subject of the 5<sup>th</sup> grade elementary school.

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