

Method On Guided Inquiry Learning To Improve Students' Critical Thinking Abilities In Facing The Industrial Revolution 4.0

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Abstract— This research is motivated by the critical thinking skills of the students of Kelapa Dua State Junior High School in Tangerang City are still relatively low. This is known from the results of preliminary studies conducted by researchers at the school. The purpose of this study was to determine the magnitude of the enhancement in mathematical critical thinking skills of students who learned using the method of guided inquiry learning at Kelapa Dua 1 Junior High School in Tangerang City. This research is a Quasi Experiment with the design using One-Group-Pretest-Posttest. From the results of data analysis shows that there is a significant enhancement in students' critical thinking skills of mathematic, and the magnitude of the enhancement in students' mathematical critical thinking abilities is in moderate conditions..

Index Terms— Guided Inquiry Method, Critical Thinking Ability, Industrial Revolution 4.0.



1 INTRODUCTION

The world is facing an industrial revolution level 4.0 in which the involvement of digital technology becomes the dynamics of the global environment. This poses a challenge for every human being, where the rapid development of technology requires us to continue to improve thinking skills in order to win increasingly fierce competition [1]. There are several thinking skills needed to answer these challenges such as critical thinking, creative thinking, and ability in problem solving [2]. Critical thinking skills are basic competencies that direct students to hone their skills in analyzing and reasoning which will then help students in practicing problem solving, creative thinking, and even motivating them to be more innovative [3]. Therefore, critical thinking skills are an important component for individuals to succeed [4].

Critical thinking becomes one part of high-level thinking skills that need to be developed in the education process [5], so that students more easily understand concepts, more sensitive to the problems that are happening, also can understand and solve the problems and also able to apply concepts in different situations [6]. This critical thinking ability is not something innate, but it can be taught to the students [7]. The same thing also expressed by Nickerson [8], i.e, the ability to think is always developing, can be taught and can be learned. Therefore, it is very important as an educator to be able to develop students' critical thinking skills [9].

But in reality, the problems that related to critical

thinking skills often escape from the attention by the teacher, and one of the reasons is the development of critical thinking is only expected to emerge as accompaniment effect (nurturan effect) or in other words it is not used as the main goal in learning [6]. One example is at SMP Negeri 1 Kelapa Dua in Tangerang City, where the ability of the students' mathematical critical thinking in the school has not been able to increasing.

One of the effort that can be made to develop critical thinking skills in learning process is by using inquiry learning methods. The inquiry learning method was first developed by Richard Suchman in 1962 [10]. Sund & Trowbridge [11], divide the inquiry learning methods into 3 forms, i.e.: 1) guided inquiry; 2) free inquiry; and 3) modified free inquiry.

The inquiry learning method that used in this study is the inquiry learning method of guidance, because the students still need a direction by teacher in finding solving problems, which is same with the opinion of Kuhlthau et al. [12], i.e the inquiry learning without guidance or direction will create chaos and the time that needed to understand the concepts will be very long since the students find it difficultly to determine core of the problem.

Through this method of inquiry learning, students can be trained to increase the ability of think critically, logically, and creatively to finding their own answers for a given problem [13]. This is similar to the statement of Prince & Felder [14], i.e. the inquiry learning method is one of the learning methods that can improve the critical thinking skills. Based on that, the purpose of this study was to determine the magnitude of the enhancement in the mathematical critical thinking skills of students who learned using the method of guided inquiry learning at SMPN 1 Kelapa Dua in Tangerang City.

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2 METHOD

2.1 Research Design

The research method used in this study is the experimental method, which is using Quasi Experiments with the experimental design is using One-Group-Pretest-Posttest.

2.2 Population and Samples

The population that used in this study was class VIII students at SMP Negeri 1 Kelapa Dua in Tangerang City. The sample used in this study was one class, i.e. the students of class VIII - 4 at SMP Negeri 1 Kelapa Dua in Tangerang City. The sampling technique that used in this study is random sampling so that this research can be carried out effectively and efficiently, especially in terms of condition of the research subject and time of the study.

3 RESULT AND DISCUSSION

3.1 Hypothesis Testing

This research was held in SMPN 1 Kelapa Dua Tangerang with 5 times of treatment, i.e. treatment 1 is for pretest, treatment 2-4 is for guided inquiry method learning, and treatment 5 is for posttest. The following are the descriptive results of the pretest and posttest statistics

TABLE 1

Descriptive Statistics

	N	Min	Max	Mean	Std. Deviation
Pretest	33	30.00	41.10	33.77	2.74
Pottest	33	37.80	85.00	59.73	12.51
NGain	33	.08	.78	.3929	.183
Valid N (listwise)	33				

The results of test of normality from data pretest, posttest, and N-Gain using the Kolmogorov Smirnov's test were obtained as follows.

TABLE 2

One-Sample Kolmogorov-Smirnov Test

		Pretest	Pottest	NGain
Normal Parameters ^{a,b}	Mean	33.77	59.73	.392
	Std. Deviation	2.74	12.50	.182
Most Extreme Differences	Absolute	.190	.141	.127
	Positive	.184	.141	.127
	Negative	-.190	-.114	-.104
Kolmogorov-Smirnov Z		1.093	.808	.727
Asymp. Sig. (2-tailed)		.184	.531	.666

a. Test distribution is Normal.

b. Calculated from data.

H₀: Data is normally distributed

H_a: Data is not normally distributed

From the results of the analysis in the data we can obtained that the value of Asymp. Sig. (2-tailed) of pretest data is 0.184 > 0.05, so H₀ was accepted. Similarly for posttest, the value of Asymp. Sig. (2-tailed) is 0.531 > 0.05, so H₀ is accepted. For the value of Asymp. Sig. (2-tailed) N-gain data is 0.666 > 0.05, so H₀ is accepted. Therefore, data of pretest, posttest, and

exercise are normally distributed.

TABLE 3
One-Sample Test

	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
					Posttest	-4.714

H₀: Average posttest data <70

H_a: Average posttest data >= 70

From the results of the analysis in the data we can obtained that the value of Asymp. Sig. (2-tailed) data pretest is 0,000 < 0.05, so H_a is accepted. This means that the students' average mathematical thinking ability after learning with guided inquiry is more than or equal to 70.

TABLE 4

Paired Samples Test

Pair 1	Pottest - Pretest	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2- tailed)
					Lower	Upper			
					25.963	12.127			

H₀: There is no difference in the average ability of students' mathematical critical thinking before and after guided inquiry learning

H_a: There is a difference in the average ability of students' mathematical critical thinking before and after learning with guided inquiry

From the results of the analysis in the data we can obtained that the value of Asymp. Sig. (2-tailed) data pretest is 0,000 < 0.05, so H_a is accepted. This means that there are differences in the average mathematical thinking ability of students before and after learning with guided inquiry. From Table 1 we can also see that the average posttest of students' mathematical critical thinking skills is higher than the average pretest of students' mathematical critical thinking abilities. To find out whether the magnitude of the average enhancement (gain) skills of the students' critical thinking is above 0.5, then from the results of the analysis with Test-t One-Sample Test we can obtained the following result.

TABLE 5

One-Sample Test

	t	df	Sig. (2- tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
					Ngain	-3.363

H₀: Average posttest data <0.5

H_a: Average posttest data >= 0.5

From the results of the t-test One-Sample Test we can see that the value of Asymp. Sig. (2-tailed) N-gain is $0.002 < 0.05$, so H_0 is accepted. This means that the magnitude of the average skills in mathematical critical thinking skills of the students is more than or equal to 0.5. Based on table of N-gain criteria (Table 6), then the average skills of critical thinking skills on mathematics is in a moderate condition.

TABLE 6
N-gain of Level Criteria

N-gain	Kategori
$g > 0.7$	Tinggi
$0.3 \leq g \leq 0.7$	Sedang
$g < 0.3$	Rendah

This condition is related to the opinion of Sanjaya [15], which says that inquiry learning methods are able to be used to improve skills of the students' critical thinking. The results of Azizmalayeri etc [16] is also proved that the guided inquiry method was able to improve the ability of students' critical thinking.

4 CONCLUSION

Now we can conclude that there exist an enhancement in skills of the students' critical thinking on mathematics. The magnitude of the enhancement is in a moderate condition.

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