

The Influence of Guided Discovery Learning Assisted by Fraction Wheel to Student Critical Thinking

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Abstract. This study aims to determine the influence of Wheel-assisted Guided discovery learning model on students' critical thinking skills. This study uses a quasi-experimental post-test only control group design. The population of this research is the fifth grade of elementary schools in the Gajah Mada group consists of 8 schools. The subjects involved 17 grade fifth students at SDN 4 Pengalusan as an experimental class and 20 grade fifth students as control classes. Data collection instruments re tests of critical thinking skills. Data analysis used t-test technique (independent sample t-test). The study concluded that fraction wheel assisted guided discovery learning models affect students critical thinking skills.

Keywords: guided discovery learning, critical thinking, fraction wheel, elementary school

1. Introduction

Critical thinking skills are needed to face the challenges of the 21st century. Based on observational data of several teachers, they show that students' critical thinking skills are low, this is indicated by the skill to understand problems, express, or write down problems that are being faced or presented by the teacher, providing a way to overcome a problem. Problem based on explicit knowledge, gathering information from various sources, arguing logically without coercion when discussing, assessing the learning outcomes themselves, assessing the learning outcomes of other groups, and drawing conclusions are still low.

To build critical thinking skills, teachers can provide learning experiences by designing the learning process. The teacher designs learning by providing problems that stimulate students' thinking skills and analytical skills [1].

Critical thinking is a reflective review that focuses on deciding what to believe and do [2]. Critical thinking skills include the ability to analyze, synthesize, information that can be trained, studied, and mastered [3]. Emily stated that "critical thinking includes the skill component of analyzing argument, making inferences using inductive or deductive reasoning, judging or evaluating and making decisions or solving problems" [4]. This definition means that critical thinking includes the skills components to analyze arguments, make conclusions, use deductive and inductive reasoning, assessments, evaluate and make problem solving decisions.

Critical thinking can be trained through guided discovery learning. This method involves students finding their meaning, organizing, and constructing ideas [5].

This learning model is proven to be successful in improving students' conceptual understanding [6]. The Guided Discovery Learning model is a learning model that encourages

students to be motivated to answer open and in-depth questions from the teacher. This model also encourages students to understand the topic of the lesson and increase motivation to learn, so this model is expected increase students' understanding of concepts and can also improve critical thinking skills.

Guided discovery is a teaching method that regulates teaching so that children acquire previously unknown knowledge not through notification, partly or being discovered by themselves [7]. In the discovery method, the students did not know what find the final form. Discovery learning is a learning process that allows students to discover for themselves through a series of concrete experiences [8]. Even what is learn is presented in a non-final form, students are require to carry out several mental activities before it is accept into their cognitive structure in learning with the guided discovery. The teacher leads to the subject matter. The guided given by the teacher can be in the form of instructions, directions, questions, so that students are expect to be able to conclude (generalize) according to the teacher's design.

The steps for Guided Discovery Learning: Stimulus, asking questions, or encouraging students to observe pictures or read books about the material. Statement of the problem, students are guided to think critically to identify as many problems as possible that are relevant to the subject matter, then selecting and formulating them in the form of a hypothesis. Data collection is students are guided to think critically to collect information. Data processing is students are guided to think critically processing data to find the concept of problem solving with the help of the fraction wheel. Verify, students are guided to think critically to associate with a careful examination to prove the correctness of the hypothesis. Generalization, students are guided to think critically to related to concluding the learning process that has been carried out [9].

Implements guided discovery needs to be supported by the media able bridge dun it concretely with abstract mathematical concepts. according to media, education is an object that can be sense, especially sight and hearing (teaching aids) both inside and outside the classroom, which is used as a connecting aid (communication medium) in the process of teaching and learning interactions to increase the effectiveness of student learning outcomes. [10].

The fraction wheel is use as a tool in stimulation syntax, data processing. The fraction wheel helps students think critically about the size of each fraction, and the formation of the idea of value fractions. The fraction wheel value is use as the basis for discovering the concept of calculating the addition and subtraction of fractions. The fraction wheel is use to support conclusions with logical arguments.

2. Research methods

This study used a quasi-experimental method in the form of Post-test Only Control Group Design [11]

The subjects of this study involved 17 fifth grade students of Elementary School 4 Pengalusan as the experimental class and 21 students of class V Elementary School pengalusan as the control class. Sampling was carried out random, by drawing lots from the entire population, namely class V Elementary School in the Gajah Mada cluster.

The data collection tool was in the form of test questions measuring critical thinking skills. Before use, the instrument is validated by an expert. The validity test of the instrument items was using Pearson's Product Moment. The effect of the guided discovery model can we will see from the difference in the post-test results between the experimental class and the

control class. Statistical calculations using a different test (t-test) independent sample test. The t-test was carried out after the normality, homogeneity test with a significance level of 0.05.

3. Results and Discussion

Instruments to measure critical thinking skills before use are get validation experts. The validation results show 3.84 (0.00-4.00), which shows an excellent category.

The validity of critical thinking skills was tested on 15 grade V SDN 3 Pengalusan children. The results of the validity trial were calculated using Pearson's Product Moment [12], showing five valid questions so that it can be used as a research instrument.

Data on students' critical thinking skills were collected using an instrument to test necessary thinking skills. The data were collected through a post-test experimental class using a guided discovery model with a control class using conventional methods.

The first stage is the pre-test of data analysis, namely the normality and homogeneity test. The prerequisite test of this research includes the Kolmogorov Smirnov normality test with $\alpha = 0.05$ and the homogeneity test using the Levene test using SPSS V.22.

Table 3.2 homogeneity test
Test of Homogeneity of Variances

df1	df2	Sig.
1	37	.740

From table 3.2 above, the sig value > 0.05 means that H_0 is accepted. So, it can be concluded that there is no difference in variance or that all data groups come from a homogeneous population. The data is normal and homogeneous, then the next step is to analyze the data using an independent sample t-test.

Table 3.3 Independent Sample 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	
math learning outcomes	Equal variances assumed	.112	.740	-9.010	37	.000	-32.90909	3.65259	-40.30995	-25.50823
	Equal variances not assumed			-8.961	33.818	.000	-32.90909	3.67260	-40.37420	-25.44398

Based on the results of the t-test above showed that the group of students given the guided discovery learning model obtained sigscore of $< \alpha$, $0.00 < 0.05$. This means that H_0 is rejected and H_1 is accepted meaning that there is an influence on learning the guided discovery model on students' critical thinking skills.

The results showed that there were differences in critical thinking skills in the math's eyes of students who used guided discovery models with students using conventional learning methods. The average post-test results of students use the guided discovery method are 55 while the average post-test of students using conventional method is 88 while the t-test shows the results of sign $0.00 < 0.005$ mean that there are differences in students who do learning

using the guided discovery method compared to students who do learning with conventional methods. So, it can be concluded that there is an influence of the guided discovery model on students' critical thinking skills.

Improving of students' critical thinking skills in the guided discovery learning model is because the stakes in the method lead students to perform step by step critical thinking. Students who do discovery cleavage conduct investigations, collect data, analyze data, verify data, formulate conclusions, or find concepts, and present reasons to support conclusions [13].

The success of the guided discovery method is assisted by fraction wheel, the function of the fraction wheels, especially in stage of data analysis, verification, formulating conclusions and logical arguments. The fraction wheel is used to support arguments regarding findings logically.

They are learning by guided discovery method conditioning students to conduct critical thinking processes [14]. By doing the thought process to find concepts, understanding the concepts obtained by students is more meaningful. The obstacles in learning guided discovery are the varied abilities of students. So, the level difficulty faced by students is diverse in finding concepts. Another obstacle is that learning mathematics with the guided discovery method is new learning for students, so that at the first meeting, students feel confused and have difficulty because usually, the teacher explains the material to be studied and gives examples of problems and solutions.

In the process of finding the concept, students get help from the teacher. The assistance provided using scaffolding techniques. The Scaffolding technique is a technique to service students while the students have difficulty above his ability to solve problems, among others in the form of asking questions and giving hints, questions presented by the teachers in the form of the question is a continuation of the question outline in the student worksheet. The assistance provided not for individuals but groups. Based on the observations, it is obtained that, the assistance provided by teacher varies from school to school, high-level schools the assistance provided tends to be less than medium and low-level schools.

Whether or not students succeed in finding the concept depends largely on the questions presented in the Student Worksheet and the oral questions the teacher gives to provoke students into thinking. The questions asked should be affordable to the students' mind so that students easily understand and construct concepts, and learn to find problem-solving. It is done, so as not to make students fail in finding concepts or so that students lose the spirit of learning.

4. Conclusion

Based on the results of data analysis in this study, it can be concluded that mathematics learning with a guided discovery model is better than conventional learning models in improving students' critical thinking skills. From the results of the study, researchers recommend implementing a guided discovery learning model so that students' critical thinking skills improve so that students through teacher guidance can find concepts and learning becomes more meaningful.

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