



## The Effect of Guided Inquiry and Modified Free Inquiry on The Critical Thinking of VII Class Students of SMP Negeri 25 Pekanbaru

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### ABSTRACT

This study aims to determine the effect of guided inquiry models and modified free inquiry on critical thinking in the classification of living things. This research was conducted at SMPN 25 Pekanbaru. The research was carried out in the form of an experiment. The study population was class VII. The sample was taken using simple random sampling technique, which consisted of 3 classes, namely the experimental class 1 using the guided inquiry model, the experimental class 2 using the modified free inquiry model and the control class using the conventional method. The research design used a pretest and posttest control group design. Data were analyzed by using ANOVA test (one way ANOVA). Based on the result data, the average critical thinking result of the classification of living things with an average value of the experimental class 1 is 77.84 (good), the experimental class 2 is 70.93 (good) and the control class is 43.29 (poor). In the experimental class class 1, the critical thinking average is higher than the experimental class 2 and the control class. Based on the results of the ANOVA test, it was stated that the use of guided inquiry models and modified free inquiry had a significant effect on students' critical thinking in the experimental class 1, the experimental class 2 and the control class with a significant value  $(0.000) < \alpha (0.05)$ .

## 1. Introduction

Education is a process in order to influence students to be able to adapt as best as possible to their environment. Thus, it will cause changes in students (Hamalik Oemar, 2017). With the existence of education, it is hoped that it can develop the potential of students to become human beings who are useful for themselves, the nation and the country as well as provide a conducive learning process experience.

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The teaching and learning process is a process of interaction between two elements, namely the teacher as a teacher and students as learning subjects. In the teaching and learning process, interaction between students and teachers requires supporting components, including interactions that educate students so that they can increase the potential for students in learning, especially in natural science (IPA) learning. Science learning is part of science that directs students' critical thinking skills and creativity in mastering the material. Critical thinking is a natural and reflective way of thinking that focuses on patterns of decision making about what to convince and do. Critical thinking has several aspects which consist of formulating problems, providing arguments, making deductions, inducing and evaluating. Research by Farida et al., (2018) states that students' critical thinking skills are categorized as very poor with an average of 49.25%, which consists of interpretation aspects of 58.57%, analysis of 47.14%, aspects of explanation 31.67%, and evaluation aspect 68.80%. Students still have difficulty in the process of organizing to solve existing problems, students learn only by memorizing concepts, students do not know basic concepts so that students' critical thinking skills are low.

Based on observations and interviews with seventh grade science teachers of SMP Negeri 25 Pekanbaru, in general the lecture method still dominates in the delivery of science material. It can be seen that there are still many students 'mastery of concepts that are classified as low, most of the students' science learning outcomes have a lot of scores that do not reach the KKM set by the school with a value of 75. This shows that in the science learning process it is found that there is low ability to think at high levels, one of which is critical thinking. . This result was reinforced by the initial score average of students' critical thinking skills from 6 critical indicators, namely formulating problems of 4.72%, providing arguments of 4.31%, deducing 1.55%, doing 4.03% induction, doing evaluation of 5.28%, and making decisions and determining actions by 5.56% with the less category. Based on the above problems, it is necessary to take action so that the science learning process becomes more active, creative, can connect knowledge with everyday life in the field, so that students are less skilled in building concepts that link to critical thinking.

The learning model is seen as being able to develop critical thinking in students, namely the guided inquiry learning model. Inquiry learning provides opportunities for students to learn how to find facts, concepts and through direct experience and develop scientific thinking and attitude skills (Ariyati, 2015). Inquiry-based learning is a constructivist theory-based learning method that is effective in developing higher thinking skills (Hutapea et al., 2020).

Guided inquiry learning, an innovative model that can improve critical thinking with the direction and guidance of teachers and modified free inquiry, that is, teachers limit providing guidance to students, so that students work more independently, so that students can find solutions to problems and train students to think at higher levels. (Ajwar et al., 2015).

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Based on the above problems, it is necessary to take an action so that the science learning process becomes more, active, interactive, understands concepts and encourages students to think critically, namely by using guided inquiry models and modified free inquiry towards critical thinking of class VII students of SMPN 25 Pekanbaru.

## 2. Methodology

This research was a quasi-experimental research, using the experimental class 1 and experiment 2 and the control class. The research design used was the pretest posttest control group design. Measurements were made in both groups in both the experimental class and the control class, the research design is shown in table 1 below:

Table 1. Research Design

Group	Pretest	Treatment	Posttest
T <sub>1</sub>	Y <sub>1</sub>	X <sub>1</sub>	Y <sub>2</sub>
T <sub>2</sub>	Y <sub>1</sub>	X <sub>2</sub>	Y <sub>2</sub>
K	Y <sub>1</sub>	-	Y <sub>2</sub>

### Information

T1 : Experiment Class 1

T2 : Experiment Class 2

K : Control Class

X1: The experimental class group was given a model treatment guided inquiry

X2: The experimental class group was given a modified free inquiry model

- : Class groups with conventional models

Y1: Pretest of the experimental class group and the control class

Y2: Posttest of the experimental class group and the control class

The population of this study was all students of class VII SMP Negeri 25 Pekanbaru in the 2018/2019 academic year odd semester, totaling 360 students divided into 8 classes. The sample was homogeneous, then taken through simple random sampling technique by selecting three classes randomly, namely the experimental class 1 and the experimental class 2 and the control class. This research was conducted from November to December in the 2018/2019 academic year. The ability to think critically in this study consists of indicators of formulating problems, providing arguments, making deductions, inducing, evaluating, making decisions and taking actions. In KD 3.2 classification of living things, the instrument is validated with valid results and to test the hypothesis used the ANOVA test.

## 3. Results and Discussion

Based on the research data of the guided inquiry model and modified free inquiry in the form of critical thinking ability test score data which consists of indicators,

namely formulating problems, providing arguments, making deductions, induction, evaluating, and making decisions and determining actions shown in table 2.

Table 2. Analysis of Students' Critical Thinking Ability KD 3.2 Classification Living things

Indicator Critical thinking	Control Class		Guided Inquiry		Modified Free Inquiry	
	<i>Pretest</i>	<i>Posttest</i>	<i>Pretest</i>	<i>Posttest</i>	<i>Pretest</i>	<i>Postets</i>
Formulate	38,16 (KS)	57,89 (C)	41,67 (K)	81,94 (BS)	40,00 (KS)	67,14 (B)
Problem	26,32 (KS)	52,92 (K)	27,78 (KS)	72,84 (B)	27,62 (KS)	66,98 (B)
Provide arguments	21,05 (KS)	28,95 (KS)	31,94 (KS)	63,19 (B)	30,71 (KS)	62,86 (C)
Making Deductions	29,39 (KS)	45,61 (K)	41,02 (K)	85,19 (BS)	31,09 (KS)	81,43 (BS)
Performs an induction	33,55 (KS)	34,87 (KS)	38,89 (KS)	81,94 (BS)	35,00 (KS)	65,71 (C)
Conduct evaluation	11,84 (KS)	39,47 (KS)	22,22 (KS)	81,94 (BS)	15,71 (KS)	81,43 (BS)
Make decisions and determine actions	26,71 (KS)	43,29 (K)	33,92 (KS)	77,84 (B)	30,02 (KS)	70,93 (B)

#### Information

KS: Very poor.

B: Good

BS: Very good

K: Less

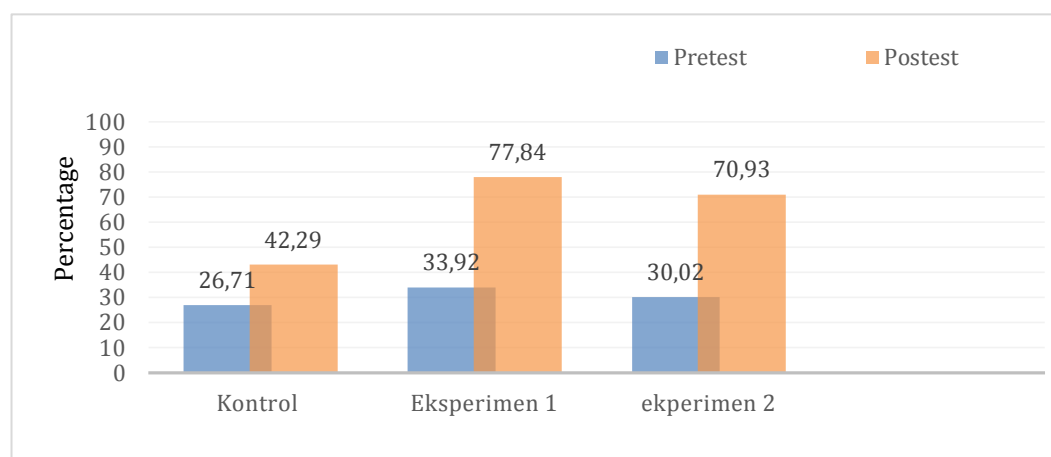
C: Enough

Table 2 shows that the average value of critical thinking skills in the experimental group and control class KD 3.2 Classification of living things. At the time of the pretest for the experimental class 1 (VII6) the average was 33.92 with a very low category, in the experimental class 2 (VII7) the average was 30.02 categories which were very poor and in the control class (VII5) the average was 26.71 also a very lacking category. This shows that the ability of the three before the intervention (treatment) is not different (homogeneous). Meanwhile, for the posttest critical thinking ability, it is known that the experimental class has a greater average score than the control class.

The experimental class 1 (VII6) had an average of 77.84 with a good category, the experimental class 2 (VII7) with an average of 70.93 with a good category and the control class (VII5) with an average average of 43.29 with a poor category. This means that after the intervention the results of the posttest and the results of the pretest are known to have a better increase in the experimental class compared to the control class (VII5). After the learning process was carried out using the inquiry model, there was an increase in both the average score of the participants' critical thinking skills compared to the control class. This is in line with that the inquiry learning model encourages students to find experimental concepts and principles so that students think critically (Hayati et al., 2019).

Guided inquiry learning model involves students in formulating analytical procedures and training students in drawing conclusions independently (Sukini et al., 2020).

Pretest and posttest data critical thinking material classification of living things is seen in Figure 1 below:



#### Information

Experiment 1 : Guided Inquiry Model

Experiment 2 : Modified Free Inquiry Model

Control : Conventional Model

Based on Figure 1 above, the highest pretest and posttest is the experimental class 1 using the guided inquiry model compared to the experimental class 2 and the control class. This is in line with the use of inquiry-based learning models where activities provide problems that can train and develop students' critical thinking (Kurniawan et al., 2015). Furthermore, according to Rositawati (2018) that the steps of guided inquiry and modified free inquiry are the basis for critical thinking and can be used as a mind map for reasoning, logical and in-depth processes accompanied by scientific arguments and evidence in the form of data. Furthermore, based on research by Sitorus et al., (2017) that the inquiry model in the learning process directs a problem that can stimulate and develop critical thinking in students.

The highest score of critical thinking in the pretest is on the indicator of the ability to formulate problems with an average score of the experimental class 1 (VII6) of 41.67 in the poor category, the experimental class 2 (VII7) of 40.00 in a very poor category and the control class (VII5) of 38, 16. This can be seen from the ability to think critically on the indicators of formulating problems, that the indicators formulate problems, develop mentally through thinking and provide high motivation for students.

The lowest pretest critical thinking ability is found in the indicators of making decisions and determining actions with an average score of the experimental class 1 (VII6) score of 22.22, the category is very low, the experimental class 2

(VII7) is 15.71, the category is less and the control class ( VII5) of 11.84 in the very poor category. It can be seen that the ability to think critically, namely making decisions and determining actions, is an indicator that can be developed where students will be trained in taking an action in making observations and helping students before being given treatment.

The highest posttest critical thinking is found in the indicator of induction, an average score of the experimental class 1 is 85.19 (very good), which is greater than the experimental class 2 of 81.43 (very good) and the control class is 45.61, category is less. In carrying out induction students are trained in analyzing data, making generalizations and drawing conclusions in conducting an experiment. This is in line with Ningsyih, et al (2016), that inquiry-based practicum learning can emphasize the activities of students who are trained to think highly in analyzing data, making generalizations and drawing conclusions. Based on the research of Setiawati, et al (2020), students 'worksheets with the inquiry model are able to emphasize students' critical thinking processes and analysis to find their own answers to problems with the help of guidance from the teacher.

Based on the results of the pretest and posttest, it is continued by analyzing statistical tests using the ANOVA test (One Way Anova). The results of the ANOVA statistical test can be seen in table 3.

Table 3. One Way Anova Test Results (One Way Anava) Absorption Power Critical Thinking Ability of Class VII Students of SMPN 25 Pekanbaru

ANOVA					
	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	15930.998	2	7965.499	95.263	.000
Within Groups	8863.314	106	83.616		
Total	24794.312	108			

Based on table 3 of the test results of the One Way Anova (one-way anova) statistical test, it shows that the results of the ANOVA analysis show that the three groups (classes) have significance (0.000) <math>\alpha</math> (0.05). It can be interpreted that there is a significant difference in the absorption of critical students between the control class, experimental class 1 and experimental class 2.

Thus it can be seen that  $H_0$  is rejected, meaning that there is a difference in the effect of guided inquiry and modified free inquiry models on the absorption of critical thinking skills. The use of guided inquiry models and modified free inquiry in the learning process can affect the absorption of critical thinking skills. In the guided inquiry class in the learning process that encourages students to think scientifically, think critically and implement guidance from the teacher in making observations.

According to Jufri (2013) guided inquiry is a learning model which is to find answers through investigations in which the teacher guides students in carrying out all activities. In modified free inquiry, the teacher only serves as direction, and the active role of students is emphasized. According to Putra (2013), the

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model of free inquiry is modified learning where students are given freedom in determining activities, the teacher limits in providing guidance. Learning with teacher guidance can make it easier for students to understand the mastery of concepts, theories, and critical thinking.

Critical thinking skills are high-order thinking activities, thinking activates the ability to perform data analysis, evaluate evidence and conclusions logically (Rahmawati et al., 2014). This is in line with Ramdani et al. (2019), the importance of developing students' critical thinking skills in science learning so that students better understand science concept problems that are related to the facts of the results of the practicum carried out. According to research by Furmanti et al. (2019), that in the inquiry model there are various activities that can encourage students to empower critical thinking skills. Furthermore, according to Salahuddin et al. (2019), that through the process of a scientific approach, namely the inquiry model can train thinking skills in students, situations that require someone's expertise by utilizing their understanding, knowledge so that they are able to find something right that can determine solutions and actions to problems faced in observations and help students to think critically.

#### **4. Conclusion**

Guided inquiry learning models and modified free inquiry affect critical thinking skills. Analysis of the one way ANOVA test results data shows that the three classes (samples) have a significance of  $0.000 < \alpha (0.05)$  there are differences in the effect of guided inquiry models, modified free inquiry and control classes on critical thinking which consists of indicators of formulating problems, providing arguments, deduction, induction, evaluating, making decisions and actions

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