JPPIPA 8(2) (2022)

Jurnal Penelitian Pendidikan IPA

*Journal of Research in Science Education*

http://jppipa.unram.ac.id/index.php/jppipa/index

# The Influence of Guided Inquiry Learning Model with Radical Constructivism on Students' Critical Thinking

Maghfirah Ulfa[1*], Yusrizal[2], Ismul Huda[2], Suhrawardi Ilyas[2]

[1] Program Studi Pendidikan IPA PPs Universitas Syiah Kuala, Banda Aceh, Indonesia
[2] Program Studi Pendidikan Fisika FKIP Universitas Syiah Kuala, Banda Aceh, Indonesia

DOI: 10.29303/jppipa.v8i1.906

**Article Info**
Received: August 19, 2021
Revised: December 29, 2021
Accepted: January 8, 2022
Published: January 31, 2022

**Abstract:** Lack of critical thinking of students in studying physics, this can be seen from their daily scores with an average of about 65.00 lower physics than other subjects. The purpose of this research problem is to determine the effect of guided inquiry learning model with radical constructivism on students' critical thinking skills. This type of research is using a quasi-experimental. The population in this study were all students of class VII MTsS Darul Ulum Banda Aceh, while the samples were taken by two classes by purposive sampling, namely class VII Experiment class (VII-1) which consisted of 30 students, while the control class (VII-3) consisted of 30 students consists of 30 students. The instrument used is a written test. The results showed that the average pre-test for the control class was 22.36, while the average for the experimental class was 32.16. These results show that the average pre-test for both the control class and the experimental class is still in the low category. And the average post-test for the control class is 47.60, for the experimental class is 64.25. This shows an increase in critical thinking in the control class through the guided inquiry learning model but it is still in the low category, namely 0.26, while the experimental class shows an increase in critical thinking through the guided inquiry learning model with radical constructivism of 0.50 in the medium category. This study proves that the inquiry learning model with radical constructivism can influence students' critical thinking.

**Keywords:** Guided Inquiry Model; Radical Constructivism; Critical Thinking and Student Motivation.

**Citation:** Ulfa, M., Yusrizal, Y., Huda, I., & Ilyas, S. (2022). The Influence of Guided Inquiry Learning Model with Radical Constructivism on Students' Critical Thinking. *Jurnal Penelitian Pendidikan IPA*, *8*(1), 109–113. https://doi.org/10.29303/jppipa.v8i1.906

## Introduction

Physics subjects are part of science that requires a comprehensive high-level understanding, physics can solve problems about integrating procedural and conceptual aspects so that a dominant analysis is needed in solving physics problems. In solving physics problems, it is necessary to have the ability to think about physics concepts that are applied in problem solving (Islamiah, et al., 2018). In this subject, students often misinterpret data and facts, therefore choosing the appropriate model is needed by the teacher (Wardani & Djukri, 2020) (Warren, 2010). One of the learning models that can make it easier to achieve physics learning goals is the guided inquiry learning model (Husnaini & Chen, 2019).

The guided inquiry model is a learning model that involves students to find concepts directly, so it is hoped that students can develop and emphasize the process of higher-order thinking skills to find solutions to any existing problems based on the knowledge gained by the students themselves. Students will tend to be more active in learning, especially in expressing their thoughts. When students have high critical

*Email: maghfirahulfa47@gmail.com

thinking skills, it also has an impact on high learning outcomes (Medriati, et al., 2021). Several previous researchers also suggested guided inquiry by Gunawan, et al., (2019) Sumarauw, et al., (2017); Juhji (2016) concludes that using the guided inquiry learning model can improve students' thinking skills.

According to Hajrin, et al., (2019), the low critical thinking skills of students is caused because teachers only use conventional learning models with lecture, discussion and question and answer methods, where the teacher is the center of information and students are listeners so that students become passive, not creative, and less active in building and discovering their own knowledge. Therefore, awareness for teachers to choose a method or learning model in delivering material is very important, the method used makes the classroom situation more active by not being teacher-centered. During the learning process the teacher can make students have a sense of wanting to develop their knowledge, especially in critical thinking in learning and being responsible for themselves. The cause of the low critical thinking skills of students in the world of education in Indonesia is because they have not been able to accommodate the development of critical thinking skills. Education at the junior high and high school levels is currently not able to be handled systematically, so that the thinking abilities of junior and senior high school students are still at low-level thinking abilities (Widiadnyana, et al., 2014). Based on this, the researcher wants to link the guided inquiry model with radical constructivism, where students are able to assume and build critical thinking based on experience in the field.

Constructivism is a learning process that explains how knowledge is organized in the minds of students, while radical constructivism is learning that builds curiosity about broader knowledge and relates material to their experiences. In general, constructivism is implementing students internally in good conditions so as to create new ideas (Leach & Scott, 2003).

Based on the results of observations and interviews that have been conducted at MTsS Darul Ulum Banda Aceh, researchers found a lack of critical thinking of students in studying physics, this can be seen from their daily scores with an average score of 65.00 physics lower than the lessons taught other. Based on the results of interviews conducted with physics teachers, information was obtained that some students have not been able to connect the material studied with the knowledge used and are lacking in solving problems related to critical thinking skills optimally, one of which is temperature and heat. As the results of the average test score of students in 2017/2018 is 60.50, in 2018/2019 it is 62.00 and in 2019/2020 the value is 65.00.

Based on the description above, from the observations and results that the guided inquiry model makes students more active so that the results received are more improved than before, and with the collaboration of guided inquiry with radical constructivism students tend to increase students' critical thinking. In this further research, the researcher wants to try the influence of the guided inquiry learning model with radical constructivism on students' critical thinking.

## Method

The design of this study used the Non-equivalent control group design. The research used was Quasi Experimental with the type of Control Group Pre-test Post-test Design. This study involved two classes, namely the experimental class and the control class.

**Table 1.** Nonequivalent control group design.

| Subject | Pre-test | Treatment | Post-test |
|---|---|---|---|
| Experiment | $O_1$ | $X_1$ | $O_2$ |
| Control | $O_3$ | $X_2$ | $O_4$ |

(Sugiyono, 2018)

Description:
$X_1$ : Learning using a guided inquiry learning model using a radical constructivism module.
$X_2$ : Learning uses a guided inquiry learning model.
$O_1$ and $O_3$ : Pre-test experimental group and control group
$O_2$ and $O_4$ : Post-test experimental group and control group

The population in this study were all seventh-grade students at MTsS Darul Ulum Banda Aceh, which consisted of 4 classes, each class consisting of 30 students with a total of around 120 students. While the samples were taken by two classes by purposive sampling, Class VII, namely the Experiment class (VII-1) which consisted of 30 students and the control class (VII-3) which consisted of 30 students. The research instrument used a written test. Data analysis techniques using data analysis Critical Thinking Skills. Hypothesis testing using normality test, homogeneity test, and hypothesis testing using correlated t-test.

## Result and Discussion

The study was conducted to determine the effect of guided inquiry learning model with radical constructivism on students' critical thinking skills. In this study, two classes were selected to be used as research samples. One class will act as the experimental class and the other class will act as the control class.

The data obtained from the research results are quantitative data. The quantitative data presented is data on the critical thinking skills of the experimental

class students consisting of 30 students and the control class consisting of 30 students. The data was obtained from the results of the pretest and posttest given to each class with an ideal score of 100 critical thinking skills.

The activities of the teaching and learning process in research can be seen in Figure 1.

**Figure 1.** Photos of activities during critical thinking research

Furthermore, the data that has been obtained is analyzed so that it can make it easier for researchers to draw conclusions. Quantitative data processing is carried out using the SPSS (Statistical Product and Service Solution) 16.0 for Windows and Microsoft Office Excel 2007 program. The following is an analysis of improving students' critical thinking, which can be seen in Table 2.

**Table 2.** Analysis of critical thinking improvement

| Classes | Critical Thinking Average | | *N-gain* | Category |
|---|---|---|---|---|
| | Pretest | Posttest | | |
| Control | 22.36 | 47.60 | 0.26 | Low |
| Experiment | 32.16 | 64.25 | 0.50 | Medium |

In Table 2. the results of the pretest and posttest scores obtained from the results of the test questions that have been given to students, it can be seen that the average pretest for the control class is 22.36, while the average for the experimental class is 32.16. These results show that the average pretest for both the control class and the experimental class is still in the low category. And the average posttest for the control class is 47.60, for the experimental class is 64.25. The results of this posttest given at the end of the lesson, this shows an increase in critical thinking in the control class through the guided inquiry learning model but it is still in the low category of 0.26, while the experimental class shows an increase in critical thinking through the guided inquiry learning model with radical constructivism of 0.50 in the medium category.

**Table 3.** Analysis of t-test results

| Classes | Norma-lity | Homo-genity | Uji-t*** | | summary |
|---|---|---|---|---|---|
| | | | $t_{count}$ | $t_{tabel}$ | |
| Control | 0.103 | 0.71 | 5.970 | 1.697 | There is difference significant |
| Experiment | 0.200 | | | | |

Both classes experienced an increase, but the experimental class experienced a greater increase than the control class. Meanwhile, if it is reviewed based on indicators, the difference in critical thinking between the control class and the experimental class can be seen in Figure 2.

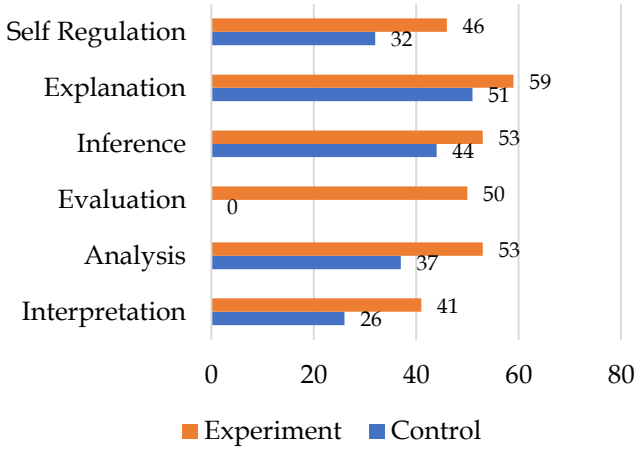


**Figure 2.** Comparison of the percentage of critical thinking scores tested through tests on the experimental and control classes based on indicators.

Hypothesis testing can be known by doing a $t_{test}$ so that it can be seen whether the results are true or not testing the hypothesis. The results are presented in Table 3.

Description:

*) : Normality Test, $L_{count} < L_{table}$ (data normal)

**) : Homogeneous Test, $L_{count} < L_{table}$ (data homogeneous)

***) : $t_{test}$, $t_{count} > t_{table}$ (there is a difference significant)

Based on the normality and homogeneity test, it is known that the normality test data for student learning outcomes in the control and experimental classes are 0.103 and 0.200 and the homogeneity test for both classes is 0.71. The value obtained from the two tests in each class is sig > 0.05, so it can be concluded that the two data are normally distributed and

homogeneous. Based on the results of normality and homogeneity testing, a t-test can then be performed to see whether the hypothesis is accepted or rejected. Hypothesis testing was measured using an independent sample test through SPSS software with a significant value > 0.05. The test results showed that the posttest scores in both classes were obtained $t_{count}$ (5.970) > $t_{table}$ (1.697), then the hypothesis Ho was rejected and Ha was accepted, meaning that there were significant differences in students' critical thinking abilities in the control class and the experimental class.

Based on the achievement of increasing critical thinking skills in the experimental class, it is better than the control class because the experimental class uses a guided inquiry learning type with radical constructivism, where this learning model makes students play a serious role when the teaching and learning process is ongoing, can solve problems, and learn independently. This is in accordance with previous researchers stated by Anwar (2008); Ulhaq, et al., (2020) & Matanluk, et al., (2013) that radical constructivism is learning that builds curiosity about broader knowledge and relates learning materials to their experiences, so that students can be more critical in accepting problems.

## Conclusion

There is an influence of guided inquiry learning model with radical constructivism on students' critical thinking. The results of the N-Gain value of critical thinking ability of the experimental class got an average of 0.50 and the control class got an average of 0.26.

## Acknowledgments

Thank you to the leadership, teaching staff, and teachers in the field of Physics at MTs Darul Ulum Banda Aceh, who have provided opportunities and service facilities while conducting research, and thank you to the supervisor who has guided in completing this article.

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