International Journal of Education, Information Technology and Others (IJEIT), December 2024, 7 (4), 192-198
DOI: https://jurnal.peneliti.net/index.php/IJEIT/article/view/10760
p-ISSN: 2654-2528 e-ISSN: 2623-2324
Accredited by Directorate General of Strengthening for Research and Development
Available online at https://jurnal.peneliti.net/index.php/IJEIT

The Effect of Guided Inquiry Learning Model Accompanied by Multirepresentation-Based LKPD on Student Critical Thinking Skills In Junior High School Science Learning

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Received: 2 December 2024
Revised: 13 December 2024
Accepted: 24 December 2024

Abstract

Science learning encourages students to learn concepts scientifically, this certainly trains students' thinking processes. Science learning becomes uninteresting for students because they face difficulties in understanding science concepts. The selection of learning models that are still teacher-orientated causes students to be less critical in addressing problems because students are accustomed to receiving material passively. The purpose of this research is to examine the effect of students' critical thinking skills using guided inquiry learning model accompanied by multirepresentation-based LKPD. This type of research is a quasi-experiment with a non-equivalent (pre-test and post-test) control-group research design. This research was conducted at SMPN 1 Tempeh which consisted of 9 classes then 2 classes were selected as samples. Methods used for data collection were pretest and posttest, observation, interview and documentation. Data were analysed using normality test, homogeneity test, independent sample t-test and N-gain test. The results showed that there was an effect of guided inquiry learning model accompanied by multirepresentation-based LKPD on critical thinking skills of junior high school students.

Keywords: Guided inquiry, Multirepresentation, Student worksheet, Critical thinking skills

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How to Cite: Harwandini, I., Mahardika, I., & Supeno, S. (2024). The Effect of Guided Inquiry Learning Model Accompanied by Multirepresentation-Based LKPD on Student Critical Thinking Skills In Junior High School Science Learning. *International Journal of Education, Information Technology, and Others*, *7*(4), 192-198. Retrieved from https://jurnal.peneliti.net/index.php/IJEIT/article/view/10760

INTRODUCTION

Students must be given the opportunity to learn concepts that can increase their critical thinking skills through science learning (Febrianti et al., 2021). Students ability to examine and formulate a problem is part of critical thinking skills. Criticallly thinking ability can be defined as the ability to think through reasoning, obtain information and make the right conclusions or decisions (Meryastiti et al., 2022). According to Agnafia (2019) that students low critical thinking is due to their learning activities focused on the process of remembering and memorising. A learning process that tends to be passive can lead to a reduction in students' ability to think critically when they are faced with problem solving. The research results of Rosliani et al. (2022) reinforces the idea that students with low critical thinking skills are caused by teachers not being able to

apply learning models and media appropriately so that students' critical thinking skills are not trained.

A learning model is an organized structure that includes a series of learning steps used to create an interesting learning environment and can stimulate students to achieve learning objectives (Mahardika et al., 2020). Guided inquiry learning models are effectively applied to develop students' critical thinking skills. This learning model encourages students to be directly involved in the search and discovery of important information about the material being taught and generates meaningful discussions during the learning process (Harahap., 2021). Wahyuni et al. (2019) found that students' critical thinking skills emerged when applying this model of guided inquiry learning, this is due to the characteristics of the guided inquiry learning model which involves students maximally in the process of searching and analyzing information to solve a problem.

One of the learning models of guided inquiry is considered capable of improving students critical thinking skills, but in the implementation there are still obstacles. According to Siahaan et al. (2021) said that the difficulty faced by students in guided inquiry learning is when formulating problems and hypotheses, this difficulty arises due to students' limited understanding of the illustrations provided by the teacher because they are not multirepresentational. Whereas each stage in the guided inquiry learning model requires multirepresentation skills so that students can more easily solve a problem. Given that each student has different knowledge and the way they receive information so that multirepresentation learning helps facilitate understanding and mastery of material concepts for students (Mahardika et al., 2020).

The success of a learning model also requires the use of media in combination to assist the learning process. Azizah & Suprapto (2021) stated that students have difficulty conducting experiments in inquiry learning because they are not supported by student worksheets (LKPD) that support them in making discoveries so that the inquiry process and guidance are not yet visible. LKPD is a collection of sheets that contain guidelines for students about the steps in doing certain tasks depending on the intended basic competencies (Triana, 2021). However, the content of LKPD often only contains text and unclear images that do not train students' ability to think critically. The solution to solve this problem so that the use of the guided inquiry learning model can be more optimal is accompanied by a multirepresentation-based LKPD.

Multirepresentation-based LKPD is a combination or combination of various representation formats such as image, verbal, mathematical, and graphic formats (Mahardika, 2012). Research by Shavira et al. (2019) confirmed that multirepresentation-based teaching materials are considered efficient in improving students critical thinking skills than conventional materials. The learning of guided inquiry with multirepresentation makes it easier for students have a good understanding of the topic because the explanation of topic is obtained from various representations (Siahaan et al., 2021). Students' concept understanding will be more optimal if learning applies various representations because critical thinking skills can be shown if the information provided to students can be received properly. So, the purpose of this study is to explain the significant effect

of guided inquiry learning model accompanied by multirepresentation-based LKPD on students' critical thinking skills in junior high school science learning.

RESEARCH METHOD

This study uses a type of quasi experiment and uses a non-equivalent (pre-test and post-test) control-group research design with 2 classes as experimental and control classes. All VIII grade students of SMP Negeri 1 Tempeh in the academic year 2023/2024 were used as the research population. Purposive sampling area was chosen as the sampling technique. Data collection was obtained from the interview, observations, documentations and tests. The test was in the form of a description of 6 questions used to determine students' critical thinking skills, each item representing each critical thinking indicator including interpretation, analysis, assessing credibility (evaluation), making conclusions, providing explanations, and self-regulation. The test was conducted before learning (pre-test) and after learning (post-test). Analyzing data in this study is homogeneity test, normality test, independent sample t-test. The data analysis process to test the impact of the guided inquiry learning model accompanied by multirepresentation-based LKPD on students' critical thinking skills used an independent sample t-test under the condition that the pretest and posttest scores of students were normally distributed.

RESULTS AND DISCUSSION

Research results

Students critical thinking skills were evaluated from tests conducted at the beginning and at the end after treatment. The test was in the form of an outline and totalled 6 questions based on the indicators of critical thinking skills described by Facione (2015). The results of the score recapitulation presented in Table 1.

Table 1. Recapitulation of Critical Thinking Ability Score

Main	Experiment Class		Control Class	
	Pretest	*Posttest*	*Pretest*	*Posttest*
Number of student	30		30	
Highest score	63	95	51	78
Lowest score	26	68	15	31
Average	38,53	77,40	29,70	50,00
Std. Deviation	8,456	7,200	7,653	8,383

Table 1 shows differences in mean scores between the experimental and control classes. The mean pretest score of the experimental class was 38.53 higher than that of the control class which was 29.70. The mean posttest score of the experimental class was 77.40 higher than that of the control class which was 50. The standard deviation obtained from both classes is relatively small, which means that the data is evenly distributed.

Data from the critical thinking skills of experimental and control classes were analysed to see significant differences between the two classes using

normality and homogeneity tests. The normality test using Kolmogorov-Smirnov presented in Table 2.

Table 2. Normality Test Result of Students Critical Thinking Ability

	Kolmogorov-Smirnov		
Class	**Statistic**	**Df**	**Sig.**
Experiment Pretest	,158	30	,053
Experiment Posttest	,129	30	,200*
Control Pretest	,121	30	,200*
Control Posttest	,137	30	,160

The results of the normality test in table 2 explain that all data are normal distribution because the sig. value is more than 0.05, including the pretest value of the experimental class of 0.053 and the control class of 0.200. In addition, the posttest of the experimental class and control class is 0.200 and 0.160 so that it is declared normal distribution because the sig. value is more than 0.05. Furthermore, the homogeneity test with the Levene test using a significant level of 5% shown in table 3.

Table 3. Homogeneity Test Results of Critical Thinking Ability Values

	Levene Statistic	**df1**	**df2**	**Sig.**
Based on Mean	,033	1	58	,857
Based on Median	,011	1	58	,919
Based on Median and with adjusted df	,011	1	51,840	,919
Based on trimmed mean	,038	1	58	,847

Table 3 presents the results of the posttest homogeneity test from both classes which states that the data is homogeneous because the sig. value is greater than 0.05, that is 0.857.

Data that has been declared normally distributed and homogeneous, then used an independent sample t-test to see the difference in mean scores between the experimental and control classes. The independent sample t-test result are presented in table 4.

Table 4. Independent Sample T-Test Result of Critical Thinking Ability Score

Independent Samples Test

		Levene's Test for Equality of Variances		**t-test for Equality of Means**		
		F	**Sig.**	**T**	**Df**	**Sig. (2-tailed)**
Critical Thinking Skills	Equal variances assumed	,033	,857	13,581	58	,000
	Equal variances not assumed			13,581	56,707	,000

Table 4 in the t-test for Equality of Means column obtained a Sig. (2-tailed) of 0.000 which means the significance value <0.05, this shows the difference in posttest scores between the experimental and control classes. According to the decision-making criteria if the Sig. (2-tailed) <0.05 then Hα is accepted and H0 is rejected and vice versa. So, the application of guided inquiry learning model accompanied by multirepresentation-based LKPD has a significant effect on students' critical thinking skills than the untreated class.

DISCUSSION

Data analysis of critical thinking skills showed that experimental and control class students have different critical thinking skills. The instructional model used affects the mean scores in both classes, where students in the experimental class tend to solve problems through various experiments that can improve their understanding of the concepts learned. According to Hidayah et al. (2022) guided inquiry learning model demands student activeness because during learning students are required to obtain a concept through discovery activities. Ilhamdi et al. (2020) also revealed that this model of guided inquiry learning encourages students to be actively involved during learning activities, where students participation in finding concepts independently helps improve their critical thinking skills. Kusuma & Busyairi (2023) in their research stated that the guided inquiry learning strategy affects their critical thinking skills because it provokes student curiosity and encourages students to find their own answers so that it directs students to think critically in processing information.

Learning is also supported by multirepresentation-based LKPD to make the presentation of information more varied and to strengthen the guided inquiry learning model because multirepresentation helps students understand concepts through various forms of representation. Multirepresentation-based LKPD helps direct students on what they should do to discover a concept in the learning process. In the experimental class, students' enthusiasm was seen during discussion activities, where students in groups exchanged opinions to solve the problems given. Discussions between students increase students' understanding of science concepts to be better and make students more critical. Nurfalina et al. (2024) stated in their research results that the use of guided inquiry learning models accompanied by multirepresentation-based LKPDs was able to improve cooperation between students in completing tasks given by the teacher during learning. Meaningful learning makes students able to link new knowledge with existing knowledge so that this can develop their critical thinking skills. According to Firdiana et al (2023) the practice of using multirepresentation-based LKPD can streamline the model used through existing syntax so as to train students' thinking processes.

CONCLUSION

Based on the results of the research that has been presented, a conclusion can be drawn that the guided inquiry learning model accompanied by multirepresentation-based LKPD has an effect on students critical thinking skills in science learning. This statement is shown through the results of the independent

sample t-test test, namely the sig value. (2-tailed) of 0.00 so that it is considered a significant effect because the sig. value is smaller than 0.05.

BIBLIOGRAPHY

Agnafia, D. N. 2019. Analisis kemampuan berpikir kritis siswa dalam pembelajaran biologi. *Florea: Jurnal Biologi dan Pembelajarannya.* 6(1): 45-53

Azizah, N. M., & Suprapto, N. (2021). Penerapan model pembelajaran inkuiri terbimbing berbasis multi representasi untuk meningkatkan hasil belajar peserta didik pada materi gelombang. *IPF*: *Inovasi Penidikan Fisika*. 10(1): 14-20

Facione, P. A. 2015. Critical thinking: what it is and why it counts. *Insight assessment*. 2007(1): 1-23

Febrianti, N. S., Utomo, A. P., & Supeno. (2021). Kemampuan berpikir kritis siswa SMP dalam pembelajaran IPA menggunakan aplikasi android getaran dan gelombang. *Optika*: *Jurnal Pendidikan Fisika*. 5(1): 26-33

Firdiana, I. R. (2023). Pengaruh Model Learning Cycle 5E Berbantuan E-LKPD Berbasis Multirepresentasi dalam Pembelajaran IPA terhadap *Higher Order Thinking Skills* Siswa SMP. *PENDIPA Journal of Science Education*. *7*(3): 355-361.

Harahap, H. S., & Harahap, N. A. (2021). Pengaruh model pembelajaran *guided inquiry dan modified free inquiry terhadap* kemampuan berpikir kritis siswa pada materi pencemaran lingkungan di SMA Negeri 1 Kotapinang. *Bio Lectura*: *Jurnal Pendidikan Biologi*. 8(2): 119-128

Hidayah, T. L., Supeno, S., & Nuha, U. (2022). Pengaruh model inkuiri terbimbing menggunakan laboratorium virtual terhadap keterampilan argumentasi ilmiah siswa SMP. *Edusaintek: Jurnal Pendidikan, Sains dan Teknologi*. 9(1): 239-250

Ilhamdi, M. L., Novita, D., & Rosyidah, A. N. K. (2020). Pengaruh model pembelajaran inkuiri terbimbing terhadap kemampuan berpikir kritis IPA SD. *Jurnal Ilmiah KONTEKSTUAL*. *1*(02): 49-57.

Kusuma, A. S., & Busyairi, A. (2023). Pengaruh Strategi Pembelajaran Guided Inquiry Terhadap Keterampilan Metakognitif dan Berpikir Kritis Mahasiswa Pada Perkuliahan Pendidikan IPA SD. *Journal of Classroom Action Research*. *5*(SpecialIssue): 88-97.

Mahardika, I.K. (2012). *Representasi Mekanika.* Jember: UPT Penerbitan UNEJ

Mahardika, I. K., Astutik, S., Zakaria, A. F., Doyan, A., & Susilawati. (2020). Pengembangan model pembelajaran *meaningful investigation laboratory* untuk meningkatkan keterampilan representasi verbal, grafik, dan matematis pada pembelajaran fisika SMA. *Jurnal Pendidikan Sains Indonesia* (*Indonesian Journal of Science Education*). 8(2): 280-291

Meryastiti, V., Ridlo, Z. R., & Supeno. (2022). Identifikasi kemampuan berpikir kritis pada pembelajaran IPA siswa SMP Negeri 1 Glenmore. *Saintifika*. 24(1): 20-29

Nurfalina, L., Wahyuni, S., & Nuha, U. (2024). Pengaruh Model Pembelajaran Inkuiri terbimbing disertai LKPD berbasis Multi Representasi terhadap

Aktivitas Belajar dan HOTS siswa SMP kelas VIII. *ScienceEdu.* 7(1): 23 28

Rosliani, V. D., & Munandar, D. R. (2022). Analisis kemampuan berpikir kritis matematis Siswa kelas VII pada materi pecahan. *Jurnal Educatio FKIP UNMA*, *8*(2), 401-409.

Shavira, T., Ertikanto, C., & Suyatna, A. (2019). Pengaruh penggunaan modul Kontekstual berbasis multirepresentasi pada materi gravitasi newton terhadap kemampuan berpikir kritis siswa. *Jurnal Pendidikan Fisika*. 7(2): 143-155

Siahaan, K. W. A., Lumbangaol, S. T. P., Marbun, J., Nainggolan, A. D., Ritonga, J. M., Barus, D. P. (2021). Pengaruh model pembelajaran inkuiri terbimbing dengan mutirepresentasi terhadap keterampilan proses sains dan penguasaan konsep IPA. *Jurnal Basicedu*. 5(1) : 195-205.

Triana, N. 2021. *LKPD Berbasis Eksperimen: Tingkatkam Hasil Belajar Siswa*. Bogor: Guepedia

Wahyuni, V. A. (2019). Pengaruh Model Pembelajaran Guided Inquiry terhadap Kemampuan Berpikir Kritis dan Retensi Peserta Didik pada Konsep Sistem Indera Manusia (Studi Eksperimen di Kelas XI Mia Man 1 Tasikmalaya Tahun Ajaran 2017/2018). *Bioedusiana: Jurnal Pendidikan Biologi*. *4*(2): 72-78.

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