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The Effect of Guided Inquiry Learning Models on Students' Critical Thinking Skills and Learning Outcomes in Science Subjects at MTs Miftahul Muin

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Abstract *–This study aims to find out the effect of Guided Inquiry Learning Model on students' critical thinking skills and learning outcomes on the concept of system of force and motion for class VIII MTs Miftahul Muin. This research is a Quasi Experimental research, with Pretest-Posttest Non-Equivalent Control Group Design. cluster random sampling technique involving two groups: one experimental group that received learning treatment using guided inquiry learning models and one control group treatment using conventional learning models. The research data were obtained through multiple-choice tests to measure students' learning outcomes and essay tests to measure students' critical thinking skills. To analyze the data, the non-parametric inferential statistics were used. Measurements include a prerequisite analysis test and hypothesis testing. The prerequisite test analysis consists of normality and homogeneity tests. Hypothesis testing used ANCOVA with SPSS 20.0 for windows at a significance level of 0.05. The results of data analysis obtained that the corrected experimental class average value for learning outcomes was 37.12 and critical thinking skills was 35.69, while the corrected average value of the control class learning outcomes was 15.20 and critical thinking skills were 16, 63 with a significant level α <0.05, that is, where the deficiency has p (0.000) <0.05. The results showed a significant effect of the guided inquiry model on critical thinking skills and learning outcomes of class VIII students of MTs Miftahul Muin.*

Keywords: *Critical Thinking Skills, Guided Inquiry Learning Model, Learning Outcomes.*

I. INTRODUCTION

The era of globalization requires human resources with intelligence, knowledge and high thinking skills, including teachers who have an essential role in producing highly competitive students (Wijayanti et al., 2019). Education is one way to develop students' will, capacity, ability, and potential (Rambe et al., 2020). Besides, education is also one of the determining factors for a nation's quality of life, conveyed through quality educators (Rahmayanti et al., 2019). Educators are one of the components that have a big role in changing students. An educator must see the factors that affect the quality of education, in this case, the learning outcomes (Ansar, 2010).

The results of observations from the teacher and several students about the learning conditions in class VIII MTs. Miftahul Muin has shown that students consider science lessons less attractive. This is shown from students' behavior during the learning process, namely students pay less attention to the teacher who is teaching. This is in accordance with the results of (Erlina et al., 2016) research, which states that the learning process carried out by teachers is still conventional and teacher-centered, teachers are more dominant in using the lecture method, so that the impact on learning outcomes obtained by students is less than optimal. Such learning creates ignorance in students about the process and attitudes of the scientific concepts that are obtained. Therefore, there should be a paradigm shift in the learning process, namely a change from teacher-centered learning to student-centered learning. In addition, students' thinking skills are still low, as illustrated in (Kurniawan, 2015) research, where students still have low learning outcomes and abilities in science, especially in physics subjects. Students tend to be unable to convey their opinions when they get problems from the teacher. Based on this statement, it is necessary to have learning that prioritizes the learning process that can make students active in constructing their knowledge through a process of investigation, finding and developing their facts and concepts, so that the activity, motivation, and learning outcomes of students increase (Pujiati et al., 2016).

This research was applied to science subjects in Human Motion Systems material. The learning model used previously in the motion system material is a conventional learning model that only uses books as a monotonous learning medium to affect student learning outcomes carried out by KKM standards. This is an important issue that teachers need to pay attention to. The first step is to change the learning model and learning media. A learning model is needed that enables the internalization of scientific thinking skills, the development of a "sense of inquiry", and students' creative thinking abilities (Hilman, 2014). The suitable learning model is the guided inquiry learning model. The inquiry learning model allows students to find and analyze problems given by the teacher to think critically in analyzing problems.

Inquiry learning has become an approach that offers authentic experiences by involving students in the knowledge construction process (Zaini et al., 2018). The essence of inquiry teaching is to organize a learning environment or atmosphere that focuses on discovering scientific concepts and principles (Erlina et al., 2016). Guided inquiry learning can be in the form of an arrangement of learning exercises that maximally covers all student capacities by finding out and emphasizing learning (Masitoh et al., 2017) obtained through the problem-solving process by training students' critical thinking skills (Rahmayanti et al., 2019) systematically, critically, logically so that analytically they

can formulate their findings with confidence (Wijayanti et al., 2018; Lintuman & Wijaya's, 2020) also states that besides improving learning achievement, it also increases students' self-confidence in learning so that their critical thinking skills. Indirectly, inquiry trains students' information literacy skills because the inquiry is related to finding and managing information into knowledge to solve problems (Rasyida et al., 2021).

Based on the research results that apply the guided inquiry learning model, the researcher is inspired to apply the guided inquiry learning model. The application of the guided inquiry learning model is expected to improve student learning outcomes and critical thinking skills. By the objectives of the research carried out, namely improving student learning outcomes and critical thinking skills by applying the guided inquiry learning model and describing the process of implementing the guided inquiry learning model in improving learning outcomes and critical thinking skills for science subjects for VIII grade students at MTs Miftahul Muin.

II. METHODS

1. Type of Research

This research is quasi-experimental, aiming to determine the effect of guided inquiry learning models on critical thinking skills and learning outcomes of science subjects at MTs Miftahul Muin.

2. Research Design

The research design used was Pretest-Posttest Non-Equivalent Control Group Design, which involved two groups: one experimental group and one control group. The experimental group was taught with the guided inquiry learning model, and the comparison group was taught using the conventional learning model. The two classes are considered the same with all relevant aspects, and the difference is only in the treatment.

Table 1. Pretest-Postest Non Equivalent Control Group research design

Pretest	Treatment	Postest
T_1	X_1 (Experiment Class)	T_2
T_1	X_2 (Control Class)	T_2

Source: Sugiyono (2010)

Information :

T_1 = Pretest was given before teaching and learning activities for the experimental class and the control class.

T_2 = Posttest was given after teaching and learning activities for the experimental class and the control class.

X_1 = Giving guided inquiry learning model for experimental class

X_2 = Giving a conventional model, namely the lecture method for the control class.

3. Research Instruments

The research instruments used in this study were learning outcomes tests and critical thinking skills tests.

a. Learning Outcomes Test

This learning outcome test was given before and after learning which

consisted of 25 multiple-choice questions. This test is prepared concerning the essential competencies and indicators by the 2013 Curriculum by compiling a learning test grid.

b. Test critical thinking skills

The critical thinking skills test consists of 5 description items with an item score of 0-5. The critical thinking rubric can be seen in Table 2.

Table 2. Critical Thinking Rubric Modified from (Ennis, 1993)

Score / Points	Descriptors
5	• All concepts are correct, clear and specific. • All descriptions of the answers are correct, clear and specific, supported by strong reasons, correct, clear arguments. • Good thinking flow, all concepts are interrelated and integrated • Grammar is good and correct • All aspects are visible, and the evidence is good and balanced.
4	• Most of the concepts are correct, clear but less specific • Most of the descriptions of the answers are correct, clear but less specific • For a good flow of thought, most of the concepts are interrelated and integrated • Grammar is good and correct, and there are small mistakes • All aspects are visible but not yet balanced
3	• Some of the concepts are true and clear. • A small part of the description of the answers is correct and precise, but the reasons and arguments are not clear. • The flow of thinking is quite good, to a lesser extent, interrelated • The grammar is quite good, and there are spelling mistakes • Most of the aspects seem correct
2	• The concept is unfocused or exaggerated, or dubious • The answer description is not supportive • The flow of thinking is not good, and the concepts are not interrelated • Good grammar, incomplete sentences • Few of the aspects that seem right
1	• All concepts are incorrect or not • The reasons are not true • The flow of thinking is not good • Bad grammar • The overall aspect is insufficient
0	• There are no answers or wrong answers.

Source: Finken & Ennis (1993)

4. Data Analysis Techniques

The research data in the form of scores from the test of learning outcomes and critical thinking skills, which include the average, the highest average, the lowest average, and the percentage change in the pretest and post-test, were analyzed using descriptive statistics to show a description of learning outcomes and critical thinking skills. The dependent variable score data is displayed in graphical form.

a. Guidelines for Scoring and Assessment

The scoring and assessment used to measure the test of learning outcomes and thinking skills of students use the following formula :

$$Score = \frac{Total\ score\ obtained}{\text{maximum score}} \times 100.$$

b. Guidelines for Categorizing Learning Outcomes and Critical Thinking Skills

Table 3. Guidelines for categorizing student learning outcomes.

Score			Category
81	–	100	Very high
61	–	80	High
51	–	60	Moderate
21	–	50	Low
0	–	0	Very low

Source: Arikunto (2011)

Table 4. Guidelines for categorizing the level of critical thinking skills of students.

Score (the number 100)			Category
90	–	100	Very high
75	–	89	High
55	–	75	Moderate
40	–	55	Low
0	–	30	Very low

Source: Dantes (2012)

c. Data Homogeneity Test

The data homogeneity test was used to determine whether several population variants were the same or not. Guidelines in decision making are:

1) If the significance value or probability value <0.05, then the data comes from a population that has unequal variants (not homogeneous)
2) If the significance value or probability value> 0.05, then the data comes from a population with the same variant (homogeneous).

d. Hypothesis testing

The data analysis technique used was inferential parametric statistics. The ANCOVA analysis test involved one independent variable and two dependent variables assisted by utilizing the SPSS for Windows 20 computer program application.

In the study, two (2) hypothesis tests were carried out, namely hypothesis I stated that there was an effect of the guided inquiry learning model on students' critical thinking skills, and hypothesis II stated that there was an effect of the guided inquiry learning model on student learning outcomes.

III. RESULTS AND DISCUSSION

1. Description of Critical Thinking Skills.

The assessment of students' critical thinking skills used before and after treatment was measured using an essay test adjusted to

the critical thinking indicator with 5 (five) numbers questions.

Based on the research results related to data analysis of critical thinking skills assessment of class VIII students on the material system of force and motion before and after the learning process using conventional models and guided inquiry models by statistical analysis can be seen in Table 5.

Table 5. Descriptive Results of the Critical Thinking Skills Assessment of Class VIII students in the pretest and post-test in the control class and the experimental class.

No	Description	Control Class		Experiment Class	
		Pretest	Postest	Pretest	Postest
1.	Maximum Value	52	88	52	92
2.	Minimum Value	12	32	4	56
3.	Average	28.15	64.32	17.60	73.60
4.	Standard Deviation	11.85	15.35	14.65	11.43

Source: Results of research data processing

In Table 5, it can be seen that the value of students' critical thinking skills between the classes taught by the conventional model is compared to the class taught by the guided inquiry model. It can be seen that there is a difference in values that can be seen statistically. The highest post-test score in the control class is 88.00, and the lowest post-test score is 32.00. Whereas in the experimental class, the highest post-test score was 92.00, and the lowest post-test score was 56.00. This proves that guided inquiry learning is effective in improving students' critical thinking skills.

Critical thinking skills can be increased because through guided inquiry learning, the teacher invites them to be actively involved in learning. Students are invited to actively think to identify problems, express problem-solving ideas, design their experiments to answer the problems at hand, conduct experiments to find answers, analyze and interpret data and discuss the results to formulate conclusions.

The data of the frequency distribution and proportion calculations based on critical and class computations in the guided inquiry class are in figure 1.

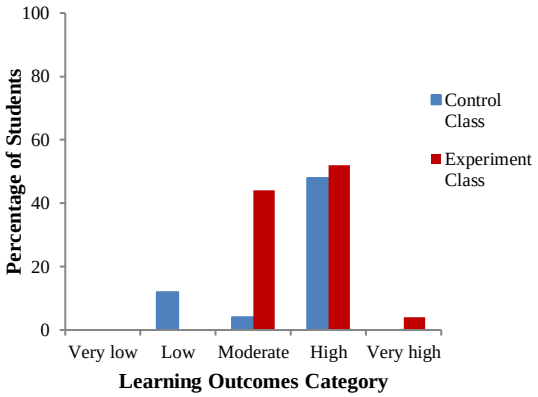

Figure 1. Frequency distribution and percentage of critical thinking scores for Conventional class and Guided Inquiry class based on Posttest scores

Figure 1 shows the difference in the value of critical thinking skills of students who are taught using conventional learning with students who are taught using the guided inquiry learning model.

2. Description of Learning Outcomes

Based on the results of research related to the learning outcomes of class VIII students on the material system of force and motion before and after the learning process to handle using the guided request learning model in experimental class and conventional learning models in control subjects can be seen in table 6.

Table 6. Statistical analysis of student learning outcomes in class VIII pretest and post-test in the control class and experimental class.

No	Description	Control Class		Experiment Class	
		Pretest	Postest	Pretest	Postest
1.	Maximum Value	48	80	60	92
2.	Minimum Value	16	16	8	5
3.	Average	34.08	49.28	34.88	72
4.	Standard Deviation	11.20	16.88	10.74	11.07

Source: Results of research data processing

In Table 6, it can be seen that the value of student learning outcomes between the classes taught by the conventional model is compared to the classes that are taught with the guided inquiry model, it can be seen that there is a difference in values that can be seen descriptively, the highest score (post-test) in the conventional model class is 80, 00 and the lowest score (post-test) 16.00 while in the guided inquiry class the highest score (post-test) was 92.00 and the lowest score (post-test) was 52.00.

Learning outcomes can be increased because guided inquiry emphasizes student activity maximally in finding and finding questionable answers independently. Besides, in the guided inquiry learning steps, students gain direct experience during the learning process.

The data of the frequency distribution and proportion calculations based on critical and class computations in the guided inquiry class are in figure 2.

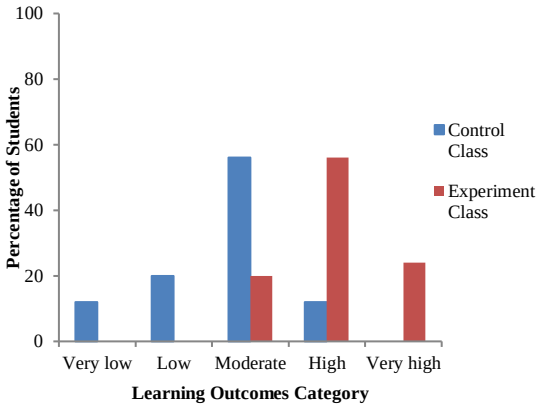

Figure 2. The distribution of frequency and percentage of post-test learning outcomes in the control class and the experimental class

Figure 2 shows differences in students taught using conventional learning with students who are taught using guided inquiry learning models.

3. Inferential Analysis

The results of inferential statistical analysis were carried out to test the research hypothesis. In this case, the Ancova test with a significance level of $\alpha = 0.05$. The conditions that must be met for testing this hypothesis are that the data obtained must be normally distributed and have a homogeneous variant.

Therefore, before the Ancova test was carried out, the normality and homogeneity tests were first carried out on students' learning outcomes and skills in conventional classes and guided inquiry classes. The normality test is carried out to determine whether the data comes from a normally distributed population. In comparison, the homogeneity test aims to determine whether the data in the study have identical or homogeneous variants. Test for normality using the One-sample Kolmogorov-Smirnov Test and homogeneity test of data variance using Levene's Test of Equality of Error Variances with the help of SPSS 20.0 For Windows.

a. Test for Normality of Variables and Critical Thinking Skills

Based on the normality test results of learning outcomes and critical thinking skills based on the Kolmogorov-Smirnow Test statistical values, the significance value is more than 0.05 in both the conventional and guided inquiry classes. The findings sig = 0.100> sig (α) = 0.05 and the guided inquiry learning model with a sig = 0.100> sig (α) = 0.05. This means that the significance for the two classes is greater than α = 0.05 so that the overall distribution of learning outcomes data and students' critical thinking skills is normally distributed.

b. Homogeneity Test of the Variance of Learning Outcomes and Critical Thinking Skills

The results of the variance homogeneity test using Levene's Test of Equality of Error Variances showed a significance value of more than 0.05. Hence, both the learning outcome data and the critical thinking skills of students had a homogeneous distribution. The data processing results using Levene's test technique obtained the value of sig = 0.307> sig α = 0.05. So, it can be concluded that the classes taught with guided inquiry learning and discovery learning models have the identical or homogeneous variances.

c. Hypothesis Test for Student Learning Outcomes who are taught through Conventional Learning with Guided Inquiry Model Learning

The proposed hypothesis testing was tested based on Ancova calculations to determine the significance value of learning outcomes and critical thinking skills between classes taught through conventional learning models and guided inquiry models.

Table 7. The results of the data analysis test used ANCOVA with SPSS 20.0 for the category of student learning outcomes.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	11627.617[a]	2	5813.808	59.300	.000
Intercept	3477.905	1	3477.905	35.474	.000
Pretest_Learning_Outcomes	5175.137	1	5175.137	52.786	.000
Group	6021.360	1	6021.360	61.417	.000
Error	4607.903	47	98.040		
Total	200096.000	50			
Corrected Total	16235.520	49			
a. R Squared = .716 (Adjusted R Squared = .704)					

Source: Results of research data processing

Table 8. The results of the data analysis test us ANCOVA with SPSS 20.0 for the category of students' crisis thinking skills.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3312.605[a]	2	1656.303	11.864	.000
Intercept	40260.755	1	40260.755	288.396	.000
Pretest_Critical_ Thinking	2236.125	1	2236.125	16.018	.000
Group	2317.708	1	2317.708	16.602	.000
Error	6561.315	47	139.602		
Total	247648.000	50			
Corrected Total	9873.920	49			
a. R Squared = .335 (Adjusted R Squared = .307)					

Source: Results of research data processing

The Ancova test results showed the value of learning outcomes and critical thinking skills of the conventional class and guided inquiry respectively p = 0.000 where both have p <0.05, H0 is rejected, and H1 is accepted. This result means that there are differences in critical thinking learning outcomes between inquiry and conventional learning models. In this way, it is concluded that guided request learning models are impacted on learning outcomes. Hence, a better learning model is a guided inquiry model based on corrected average scores.

The results of this hypothesis test are strengthened by the corrected average value of learning outcomes and critical thinking skills on each learning variable.

Table 9. The corrected average of learning outcomes and critical thinking skills on each learning variable

Variable	Class	Average
Learning Outcomes_Posttest	Conventional Class	15,200
	Guided Inquiry Class	37,120
Critical Thinking Skills_Posttest	Conventional Class	16,626
	Guided Inquiry Class	35,694

Source: Results of research data processing

In Table 7, it is shown that in the lecture class, the corrected mean score of learning outcomes is 15,200 and critical thinking skills are 16,626; while in the guided inquiry class, the corrected mean value for learning outcomes is 37,120; and critical thinking skills are 35,694. This means that the learning outcomes and skills of guided inquiry classes are higher than conventional classes.

The average value of student learning outcomes and critical thinking skills obtained in the experimental class is higher than the control class. In line with the results of (Dhaaka, 2012) study entitled Biological Science Inquiry Model and Biology Teaching, the analysis results can be concluded that the learning concept of the investigative model is more effective than conventional teaching methods. Relevant research has also been conducted by (Usdalifat et al., 2016), found that the application of the inquiry learning model has an impact on the essential ability to weigh and the talent to handle students in science subjects. Besides that, it is also supported by the research results of (Sularso et al., 2015), the application of the guided inquiry learning model demonstrated a substantial effect on students' basic thinking skills. This can happen because, through guided inquiry learning, the teacher invites students to be actively involved in learning. Students are invited to identify problems actively, express problem-solving ideas, design their experiments to answer the problems faced, conduct experiments to find answers, analyze and interpret data, find answers, and discuss the results to reach conclusions. Guided inquiry can train intellectual skills, critical thinking and be able to solve problems scientifically. The problem-solving process is associated with everyday problems so that students can learn to solve problems they face in everyday life and problems that come from natural phenomena that result in students being involved in thinking behavior. In line with the research of (Falahudin et al., 2016; Sumarni, 2017;

Hasanah et al., 2020; Hidayati, 2016), who prove that the application of the guided inquiry learning model has a significant effect on students' critical thinking abilities compared to using conventional learning methods (lectures) and classical completeness of learning outcomes has been achieved, both cognitive products and cognitive processes, and there is a correlation with each other. In principle, the whole guided inquiry learning process helps students become independent, confident, and confident in their intellectual abilities to be actively involved. The teacher guides students in learning so that they are expected to develop students' critical thinking skills through guided inquiry syntax.

The results showed that the guided inquiry learning model in science learning significantly affected student learning outcomes and critical thinking skills. Learning that involves student activities in problem-solving through posing problems, presenting hypotheses, testing hypotheses with experimental or experimental activities, and analyzing data can train critical thinking skills.

IV. CONCLUSION AND SUGGESTION

Based on the research results, it can be shown that there is an influence of the guided inquiry learning model on critical thinking skills and student learning outcomes of class VIII MTs Miftahul Muin.

In connection with the research stated above, the researcher suggestion, namely:

a. The results of this research will be able to be a lesson for eye teachers, especially science subjects, in order to improve learning outcomes and to think abilities of students;
b. For subject science teachers, it is hoped that they can apply the appropriate and appropriate guided inquiry learning model using this learning model in order to improve learning outcomes and students' critical thinking skills; and
c. It is hoped that other researchers in education, especially science, will research an effective and efficient model further to overcome student learning difficulties in learning science.

REFERENCES

Ansar. (2010). Peningkatan motivasi dan hasil belajar kimia siswa kelas X 5 SMA Negeri 1 Gangking melalui pembelajaran tuntas improving of motivation and learning achievement of students of class X 5 of SMAN 1 Gangking through completely teaching. *Jurnal Chemica, 11*(1), 28–39.

Arikunto, S. (2011). *Prosedur Penelitian : Suatu Pendekatan Praktik* (Ed. Rev. V). Rineka Cipta.

Dantes, N. (2012). *Metode Penelitian*. Andi Offset.

Dhaaka, A. (2012). Biological Science Inquiry Model And Biology Teaching. *Bookman International Journal of Accounts, Economics & Business Management*, *1*(2), 80–82.

Erlina., Rede, A., & Saehana, S. (2016).

Penerapan model pembelajaran inkuiri terbimbing untuk meningkatkan aktivitas dan hasil belajar IPA fisika siswa kelas V SD Inpres 2 Kayumalae Ngapa. *Jurnal Mitra Sains*, *4*(1), 1–7. https://doi.org/10.36709/jipfi.v4i1.14138

Falahudin, I., Wigati, I., & Pujiastuti, A. (2016). Pengaruh model pembelajaran inkuiri terbimbing terhadap kemampuan berpikir kritis siswa pada pembelajaran materi pengelolaan lingkungan di SMP Negeri 2 Tanjung Lago, Kabupaten Banyuasin. *Jurnal Bioilmi*, *2*(2), 92–101. https://doi.org/10.19109/bioilmi.v2i2.1133

Finken, M., & Ennis, R. H. (1993). Illinois critical thinking project; Departement of Educational Policy Studies University of Illinois. http://www.criticalthinking.net/IllCTEssayTes%0AtFinken-Ennis12-1993LowR.pdf

Hasanah, S., Purwoko, A. A., & Hakim, A. (2020). The effect of guided inquiry learning model and scientific performance on student learning outcomes. *Journal of Science and Science Education (JoSSEd) Environment.*, *1*(1), 15–20. https://doi.org/10.31002/ijose.v2i1.596

Hidayati, N. (2016). Hasil Belajar dan Keterampilan Berpikir Kritis Siswa Madrasah Tsanawiyah Dalam Pembeljaran IPA Melalui Kerja Ilmiah. *Proceeding Biology Education Conference*, *13*(1), 118–127.

Hilman. (2014). Pengaruh pembelajaran inkuiri terbimbing dengan mind map terhadap keterampilan proses sains dan hasil belajar IPA. *Jurnal Pendidikan Sains*, *2*(4), 221–229.

Kurniawan, E. (2015). Pengaruh model pembelajaran berbasis masalah terhadap kemampuan berpikir kritis peserta didik kelas XI IPA SMA Negeri 3 Takalar. *Jurnal Pendidikan Fisika*, *5*(2), 127–136.

Lintuman, A., & Wijaya, A. (2020). Keefektifan model pembelajaran berbasis inkuiri ditinjau dari prestasi belajar dan kepercayaan diri dalam belajar matematika siswa SMP. *Jurnal Riset Pendidikan Matematika*, *7*(1), 13–23. http://journal.uny.ac.id/index.php/jrpmhttps://doi.org/10.21831/jrpm.v7i1.17878

Masitoh, I. D., Marjono., & Ariyanto, J. (2017). Pengaruh model pembelajaran inkuiri terbimbing terhadap kemampuan berpikir kritis siswa kelas X MIA pada materi pencemaran lingkungan di Surakarta. *Bioedukasi*, *10*(1), 71–79. https://jurnal.uns.ac.id/bioedukasi/article/download/11276/pdf_

Pujiati., Hala, Y., & Taiyeb, A. M. (2016). Peningkatan aktivitas, motivasi dan hasil belajar ipa biologi peserta didik kelas VIIIA-1 MTsN Watampone melalui model pembelajaran inkuiri terbimbing. *Jurnal Sainsmat*, *V*(1), 78–93.

Rahmayanti, R., Suprijono, A., & Haidar, M. A. (2019). Influence of the inquiry learning model of "pictorial riddle" on critical thinking skills of man karimun students in social conflict materials. *International Journal of Scientific and Research Publications (IJSRP)*, *9*(8), 204–208. https://doi.org/10.29322/ijsrp.9.08.2019.p9231

Rambe, Y. A., Silalahi, A., & Sudrajat, A. (2020). The effect of guided inquiry learning model and critical thinking skills on learning outcomes. *Proceedings of the 5th Annual International Seminar on Transformative Education and Educational Leadership (AISTEEL 2020)*, *488*, 151–155. https://doi.org/10.2991/assehr.k.201124.033

Rasyida, L. A., Istiyadji, M., & Sauqina, S. (2021). The relationship between inquiry learning model and students' information literacy skills at SMP Negeri 5 Banjarmasin on classification of living things. *BIO-INOVED : Jurnal Biologi-Inovasi Pendidikan*, *3*(1), 12–17. https://doi.org/10.20527/bino.v3i1.9129

Sugiyono. (2010). *Metode Penelitian Pendidikan Pendekatan Kuantitatif, kualitatif, dan R&D*. Alfabeta.

Sularso, A., Karyanto, P., & Sugiharto, B. (2015). Pengaruh penggunaan model pembelajaran inkuiri terbimbing

terhadap kemampuan berpikir kritis siswa ditinjau dari gaya belajar siswa kelas X SMA N Karangpandan tahun pelajaran 2012/2013. *Bio-Pedagogi*, *4*(2), 1–4. http://www.jurnal.fkip.uns.ac.id/index.php/pdg/article/view/7338%5Cnhttp://www.jurnal.fkip.uns.ac.id/index.php/pdg/article/viewFile/7338/5118

Sumarni, S. (2017). Problem based learning untuk peningkatan hasil belajar IPS Siswa Kelas IV SDN 08 Marunggi Kota Pariaman. *Jurnal EDUCATIO: Jurnal Pendidikan Indonesia*, *3*(1), 10–18. https://doi.org/10.29210/12017266

Usdalifat, S., Ramadhan, A., & Sulesman, S. M. (2016). Pegaruh model pembelajaran inkuiri terhadap kemampuan berpikir kritis dan keterampilan proses siswa pada mata pelajaran IPA Biologi Kelas VII Negeri 19 Palu. *Jurnal Sains Dan Teknologi Tadulako*, *5*(3), 1–10. http://jurnal.untad.ac.id/jurnal/index.php/JSTT/article/view/6975

Wijayanti, E., Ashadi., & Sunarno, W. (2018). Effect of guided inquiry learning model with virtual and real learning media on the improvement of learning result viewed from cooperation skills of the students in grade VIII of state junior secondary school 1 of Karanganyar. *5th ICRIEMS Proceedings*, 163–170. https://doi.org/10.1063/1.5054430

Wijayanti, M. D., Rahardjo, S. B., Saputro, S., & Mulyani, S. (2019). Item analysis of critical thinking skills instrument to measure effectiveness of scientific group inquiry learning (SGIL) model. *Jurnal Pendidikan IPA Indonesia*, *8*(4), 538–546. https://doi.org/10.15294/jpii.v8i4.20794

Zaini, M., Kaspul., & Rezeki, A. (2018). Hasil belajar dan keterampilan berpikir kritis siswa sma pada pembelajaran biologi menggunakan model inkuiri. *BIOEDUKASI : Jurnal Pendidikan Biologi*, *11*(1), 17–22. http://dx.doi.org/10.20961/bioedukasi-uns.v11i1.19732