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The Effect Of Guided Inquiry Learning Model to Improving Student's Interest and Learning Outcomes on Chemical Bonding Material

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Abstract: The Effect of Guided Inquiry Learning Model on Increasing Students' Interest and Learning Outcomes in Chemical Bonding Material. This study aims to determine the effect of the Guided Inquiry model on increasing students' interest and learning outcomes in chemical bonding material. This study was conducted at SMA Negeri 1 Percut Sei Tuan, Jl. Irian Barat No. 37, Medan Estate, Percut Sei Tuan District, Deli Serdang. The sample used was students of class X-4 as the experimental class and class X-1 as the control class. The instrument used was a test instrument in the form of a multiple-choice objective test to see students' learning outcomes obtained through a posttest and a questionnaire in the form of a statement to see student's learning interest. The results of the study showed that there was an effect of the guided inquiry model on increasing students' interest and learning outcomes in chemical bonding material. This can be seen from the results of the posttest hypothesis test using the t-test obtained that $t_{count} > t_{table} = 9.6 > 1.6$. The results of the study of students' learning interests using the t-test obtained a calculated $t_{count} > t_{table} = 5.6 > 1.6$. The relationship between interest and student learning outcomes shows a correlation of 0.62 (high correlation).

Keywords: Chemical Bonding, Guided Inquiry.

Abstrak: Pengaruh Model Pembelajaran Inkuiri Terbimbing Terhadap Peningkatan Minat dan Hasil Belajar Siswa Pada Materi Ikatan Kimia. *Penelitian ini bertujuan untuk mengetahui pengaruh model Inkuiri Terbimbing terhadap peningkatan minat dan hasil belajar siswa pada materi ikatan kimia. Penelitian ini dilaksanakan di SMA Negeri 1 Percut Sei Tuan, Jl. Irian Barat No. 37, Medan Estate, Kec. Percut Sei Tuan, Deli Serdang. Sampel yang digunakan adalah siswa kelas X-4 sebagai kelas eksperimen dan kelas X-1 sebagai kelas kontrol. Instrumen yang digunakan dalam penelitian ini adalah instrumen tes berupa tes objektif pilihan ganda untuk melihat hasil belajar siswa yang diperoleh melalui posttest dan angket berbentuk pernyataan untuk melihat minat belajar siswa. Hasil penelitian menunjukkan bahwa terdapat pengaruh model inkuiri terbimbing terhadap peningkatan minat dan hasil belajar siswa pada materi ikatan kimia. Hal ini dapat dilihat dari hasil uji hipotesis posttest dengan menggunakan uji-t diperoleh bahwa $t_{hitung} > t_{tabel} = 9,6 > 1,6$. Hasil penelitian minat belajar siswa dengan menggunakan uji-t diperoleh nilai $t_{hitung} > t_{tabel} = 5,6 > 1,6$. Hubungan antara minat dengan hasil belajar siswa menunjukkan korelasi sebesar 0,62 (korelasi tinggi).*

Kata kunci: *Ikatan Kimia, Inkuiri Terbimbing .*

▪ INTRODUCTION

Education is a learning process for students to learn something that is not yet known so that it makes humans more critical in thinking. Education is carried out by

groups of people who are passed down from one generation to the next through education. According to Waspodo (2023), education is an important thing in life which means that every human being has the right to get education and hopes to always develop in education. In Indonesia, the field of education itself has experienced many changes from the early days of development to the present. The field of education is currently experiencing developments along with the development of technological and information technology. One aspect of the development of Indonesian education is the change in curriculum from the previous 2013 curriculum (K13) to the Merdeka's curriculum which has now been widely implemented in many schools from the lower levels to universities. In line with the development of the times, a teacher must be required to be able to apply various learning models so that learning objectives can still be achieved. However, due to time constraints and facilities available at school, most teachers still use conventional learning, namely using friendly teaching methods and using school textbooks in teaching their students. As a result, students' interest in the material being taught will decrease so that it will have an impact on learning outcomes later.

Based on the results of observations conducted in chemistry lessons in chemical bonding subjects in class X SMA Negeri 1 Percut Sei Tuan in the 2024/2025 several findings were obtained, there were several problems that needed to be identified. First, there was a lack of student understanding of the concept of chemical bonds, especially in describing the Lewis Structure. Second, the learning models applied by teachers in chemistry subjects were still less varied, which could hinder student involvement in the learning process. Third, the learning media used were less specific and adequate, so that the process of student understanding of chemistry subjects did not go well. Most of the chemistry learning process is carried out using friendly learning models or one-way learning, which gives students the opportunity to discover the chemical concepts they are studying themselves, so students gain knowledge directly from the finished products provided by their teachers, thus reducing the training of students' rational thinking skills (Asni et al., 2021). The application of this conventional learning model results in students being less interested in understanding the material presented by the teacher (Umar et al., 2023). Teachers who are less skilled in implementing learning models, utilizing materials and teaching materials that result in a decrease in student learning interest which can later cause student learning outcomes to decline so that, in overcoming the problems that exist in the school, a learning model is needed that is centered on students on the subject of chemical bonds.

Seeing the conditions above, the researcher took the initiative to implement a guided inquiry learning model for students of SMA Negeri 1 Percut Sei Tuan, class X in the learning process. Elements of process skills contained in chemistry learning outcomes, especially analyzing skills in their application require a discovery-based learning model. One of the discovery-based learning models is the guided inquiry model, in which in the learning process students experiment, collect and analyze data, formulate and evaluate hypotheses, and conclude based on their own experiences (Aini et al., 2017; Mulyana et al., 2018; Hermansyah et al., 2019; Risna et al 2020). Through guided inquiry-based learning, students are guided to find problems, formulate hypotheses, conduct experiments to obtain information or data related to the material discussed, collect data, analyze data, and draw conclusions (Nurmayani et al., 2018). In the implementation of guided inquiry learning, teachers provide guidance or instructions for students (Sanjaya, 2008) in this case the teacher acts as a source of information

(Yasmin et al., 2018). The stages of guided inquiry learning model development start from Orientation, Formulating problems, Formulating hypotheses, Collecting data, Testing hypotheses and Drawing conclusions (Sanjaya, 2008). Learning that uses the guided inquiry model makes students' analyzing skills well trained (Chandra et al., 2020; Kusmelinda et al., 2022). This is in line with Firmanda and Novita's research (2022) which mentions that guided inquiry learning has improved learning outcomes and interest. With the guided inquiry-based learning stages that use innovative learning enhancements, then by applying guided inquiry learning can improve the completeness of student learning outcomes, especially in chemical bonds material.

▪ METHOD

Research Location and Time

This research was conducted in the 2024/2025. The research location was at SMA Negeri 1 Percut Sei Tuan, Jl. Irian Barat Desa Sampali No. 37, Medan Estate, Kec. Percut Sei Tuan, Deli Serdang, North Sumatra.

Research Subjects and Objects

The population in this research was all students of grade X at SMA Negeri 1 Percut Sei Tuan in the 2024/2025 and totaling 10 classes (Grade X-1 to X-10). The samples used in this research are 2 classes, namely class X-4 as the experimental class and class X-1 as the classroom class. The class selected as the experimental class is given teaching with guided inquiry movement and in the classroom class is taught by implementing the classroom movement.

Type and Design of Research

This research method is a quasi-experimental research. The research design used is Pretest-Posttest Group Development (Silitonga, 2014). There are two methods in the development of research, namely the experiment method and the control method development with the different treatment.

Data Collection Techniques

Data collection in research is divided into 2, namely the technique of collecting data test and non test. The test data used were 20 questions with five answer choices that had been validated and analyzed, while the non-test data used were 20 statements that had been validated. The instrument was then given at the beginning of learning (pretest) and the end of learning (posttest). Data analysis used statistical tests using Ms. Excel. The requirements for parametric tests on questions are normally distributed and homogeneous so that hypothesis testing can be carried out using the one-tailed right-tailed t-test.

▪ RESULT AND DISCUSSION

RESULT

A. Analysis of Question Instruments

1. Question Validity

To calculate the validity of the questionnaire items, the Excel program is used to determine the validity of each questionnaire item and is adjusted to the table. The

criterion used is if rcount> rtable then the questionnaire is declared valid. For N = 34 with a significance level of α = 0.05 and a test of rtable of 0.339. The results of the questionnaire validation test on students showed that out of 40 questionnaires, 29 were valid and 11 were invalid.

2. Question Reliability

From the results of the reliability analysis of the test determined by the KR-20 formula at α = 0.05 (N = 34), the results of rhit = 0.950 and rtabel = 0.339, so it can be concluded that 29 questions are declared valid. Overall, the test has a very high level of reliability so that this test is declared reliable

3. Discriminatory Power

The test power analysis is used to determine whether the test used can distinguish between students with high ability (smart) and students with low ability (not smart). The test power test results show that out of 29 valid test items, 6 test items are declared very good, 19 test items are declared good and 4 test items are declared sufficient

4. Difficulty Level

The test item difficulty level analysis is used to determine whether the test items are in the easy, medium or difficult test item category. A good test item is a test item that is not too difficult and not too easy. From the results of the calculation of the level of difficulty, it can be seen that 29 questions were declared valid, 5 questions were declared difficult 17 questions were declared moderate, and 7 questions were declared easy.

B. Analysis of Learning Outcomes and Learning Interest Data

1. Learning Outcome And Interest Data

Before the two samples were given different treatments, an initial test was given first, namely a pretest with the aim of evaluating students' initial knowledge in both classes on the subject of chemical bonds. Then, a learning evaluation was carried out with different treatments in both classes, namely, the first class used a guided inquiry learning model with a whiteboard medium, while the second class used a collaborative learning model with a whiteboard medium. At the end of the lesson, a final test was given in the form of a questionnaire in both classes with the aim of knowing the differences in student learning outcomes before and after the treatment. The results of the values tested from the results of the pretest and questionnaire in the evaluation class and the final class are summarized in table 1**.**

Table 1. Results of Average Pretest and Posttest Scores

Class	**Data**					
	Pretest			**Posttest**		
	$\bar{X}$	S^2	**S**	$\bar{X}$	S^2	**S**
Experiment	38,50	129,56	11,38	82,17	39,10	6,25

Control	37,83	194,28	13,93	63,83	70,14	8,37

Based on the table, it is known that the average pretest score of students in the experiment class is 38.50 and in the control class is 37.83. This shows that the lack of students' understanding of the material of chemical bonds has an impact on the low scores obtained and none of the students achieved the KKM score of 70. Then a posttest was carried out, the average score of students in the experiment class was 82.17 and in the control class was 63.83. This shows changes in learning outcomes in both classes. This shows that students' learning interest in both classes before and after being treated is different. This is in line with research conducted by Hamidah & Haryani, 2018 which states that guided inquiry model has stages of inquiry learning that will be able to improve student activity and learning outcomes in learning.

From table 1. above, the average pretest and postest values of students can be described in the following diagram (Figure 1).

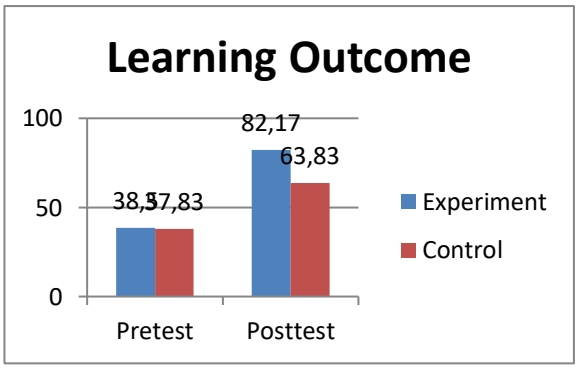

Figure 1. Average student learning outcome diagram

Data collection for students' learning interest was conducted using a learning interest questionnaire consisting of 20 statements filled in directly by students. Based on the results, the average value of students' learning interest is summarized in table 2.

Table 2. Average Student Learning Interest Score

Class	**Data**					
	Before			**After**		
	$\bar{X}$	**S^2**	**S**	**$\bar{X}$**	**S^2**	**S**
Experiment	55,37	43,82	6,61	71,37	24,17	4,91
Control	60,00	25,03	5,01	65,17	16,21	4,02

Based on the table of results of learning interest above, it is known that learning interest before being treated in the experimental class is 55.37 and in the experimental class is 60.00. Then after being treated, the average value of learning interest in the experimental class is 71.37 and in the experimental class is 65.17. This shows that students' learning interest in both classes before and after being treated is different. This is in line with Firmanda and Novita's research (2022) which mentions that guided inquiry learning has improved learning outcomes and interest

From table 2. above, the average value of students' learning interest can be described in the following diagram (Figure 2).

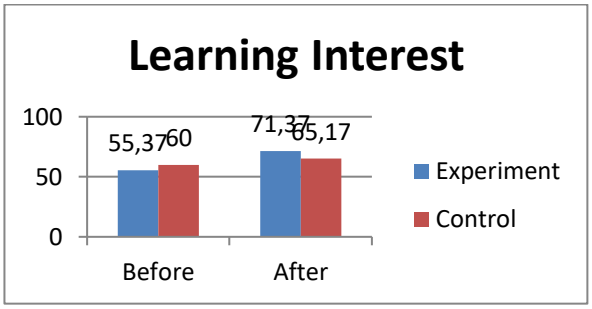

Figure 2. Average student learning interest diagram

2. Data Analysis Requirements Test

- Gain Test

The gain test is conducted to determine the difference in learning outcomes (pretest and posttest) and learning interest (initial and final). Therefore, from the calculation results, it is known that:

Table 3. Improvement of Learning Outcomes and Interest (Gain)

Class	Data	N-Gain	Criteria	Description
Experiment	Learning outcomes	0,70	1. 0,70≤g≤1,00= High 2. 0,30≤g<0,70= Medium 3. 0,00≤g<0,30= Low 4. g = 0,00 = No increase occurred 5. −1,00 ≤g≤0,00 = decreased	High
	Learning interest	0,63		Medium
Control	Learning outcomes	0,40		Medium
	Learning interest	0,24		Low

Based on table 3, the increase in student learning outcomes in the experimental class is 70% higher than in the semi-automatic class which is 40%. The difference in the increase in student learning outcomes in the two classes is 30%. Meanwhile, student learning interest in the experimental class is 63% higher than in the semi-automatic class which is 24% with a difference of 39%.

- Normality Test

Student Learning Outcomes

The normality test of the data is carried out using the Chi Square Test at a significance level of $\alpha = 0.05$ with a criterion if X^2 count < X^2 table then the data is called normally distributed. The data that is measured can be seen in the following table 4.

Table 4. Learning Outcome Normality Test

Class	Data	X^2_{hitung}	X^2_{tabel}	α	Description
Experiment	Pretest	6,85	7,81	0,05	Normal
	Posttest	6,95			Normal
Control	Pretest	6,25			Normal
	Posttest	4,5			Normal

From the table above, it can be concluded that X^2 count on the pretest and posttest data is in the variable and variable classes is smaller than X^2 table so that the data is normally distributed.

Student Learning Interest

In the normality test of data for student learning interest, the Chi Square Test was carried out at a significance level of $\alpha = 0.05$ with a criterion X^2 count < X^2 table then the data is called normally distributed. The data that was measured can be seen in table 5 below.

Table 5. Learning Interest Normality Test

Class	Data	X^2_{hitung}	X^2_{tabel}	α	Description
Experiment	Before	6,55	7,81	0,05	Normal
	After	6,10			Normal
Control	Before	5,95			Normal
	After	6,55			Normal

Based on the table above, X^2 count data at the beginning and end are in the variable and variable classes are smaller than the X^2 table value so that the data is normally distributed.

- Homogenity Test

Student Learning Outcomes

The Homogenity test is conducted to determine whether the data is Homogenenous or not by looking at the variance value. In this study, the Homogenity test is conducted with the following criteria: if Fcount <Ftable with a significance level of $\alpha = 0.05$, then the data is called Homogenenous. The results of the Homogenity test can be seen in the following table 6.

Table 6. Learning Outcome Homogeneity Test

Kelas	Data	F_{hitung}	F_{tabel}	Description
Experiment	Pretest	1,49	1,86	Homogenous
Control				
Experiment	Posttest	1,79	1,86	Homogenous
Control				

From the table data above, Ftable = db (n1 - 1), (n2 - 1) (α = 0.05) = 1.86 because Fcount <Ftable then H0 is accepted because there is no difference in data variance in the experimental and control classes.

Student Learning Interest

The results of the student learning interest Homogenity test can be seen in table 7 below.

Table 7. Learning Interest Homogeneity Test

Kelas	Data	F_{hitung}	F_{tabel}	Keterangan
Experiment	Before	0,57	1,86	Homogenous
Control				
Experiment	After	0,67	1,86	Homogenous
Control				

From the table data above Ftable = db (n1 - 1), (n2 - 1) (α = 0.05) = 1.86 because Fcount <Ftable then H0 is accepted because there is no difference in data variance in the experimental and control classes.

- Hypothesis Test I

Hypothesis test is conducted to determine whether the hypothesis in this study is accepted or rejected. If the data is known to be normal and non-normal distribution, then the hypothesis will be tested using the one-tailed right-tailed t-test with the criterion tcount > ttable, then the hypothesis is accepted (Ha) and the 0 hypothesis is rejected (H0).

Table 8. Learning Outcome Hypothesis Test Results

Class	$\bar{X}$	S^2	Tcount	Ttable	Description
Experiment	82,17	39,10	9,60	1,67	H0 rejected, dan Ha accepted
Control	63,83	70,14			

From the table above, it can be concluded that for the learning results, tcount > ttable or 9.60 > 1.67, so Ha is accepted and rejected on H0. According to previous research conducted, the application of guided inquiry learning movement development has an effect on improving student learning outcomes (Lubay, et al., 2024; Sulistyaningsih, et al. 2020; Murningsih et al. 2016).

- Hypothesis Test II

Hypothesis test is conducted to determine whether the hypothesis in this study is accepted or rejected.

Table 9. Learning Interest Hypothesis Test Results

Class	$\bar{X}$	S^2	Tcount	Ttable	Description
Experiment	71,37	24,17	5,60	1,67	H0 rejected, dan Ha accepted
Control	65,17	16,21			

From the table above, it can be concluded that for the learning interest, tcount > ttable or 5.60 > 1.67, so Ha is accepted and rejected on H0.

- Hypothesis Test III

In the Hypothesis III test or covariation test, the Product Moment Test is used to determine the relationship between interest and learning outcomes. The criterion in this test is rcount > rtable, its use is to determine whether the hypothesis in the study is accepted or rejected.

Table 10. Learning Interest Correlation Test Results

Data	N	rcount	rtable	CD	Description
Interest and learning outcomes	30	0,624	0,361	38,9%	H0 rejected, dan Ha accepted

Based on the results in the table above, it can be concluded that there is a positive covariation between learning interest and learning outcomes because the rcount value is > rtable or 0.624 > 0.361 with a corelation coefficient of 38.9% while 61.1% is caused by other factors. Students who have high interest make students more confident in answering questions, learning is more enjoyable because there is no element of coercion, higher awareness is greater and they feel responsible (Rohmah, 2019)**.** This is supported by previous research, namely according to Karina et al. (2017) who said that having learning interest has been proven to improve student learning outcomes in classroom learning.

- **DUSCUSSION**

Based on the results of the research conducted, the average pretest in the experiment class was 38.50 and in the control class 37.83. For the results of students' initial learning interest, the average score was 55.37 in the experiment class, and 60.00 in the control class. In the experiment class using the guided inquiry learning model, the average value of the posttest was 82.17 and the average value of the final learning interest was 71.37. While in the control class using the conventional model, the average value of the posttest was 63.83 and the average value of the final learning interest was 65.17. In the N gain test, the increase in learning outcomes in the exsperiment class in the high category (0.70) and for learning interest in the medium category (0.63). While in the control classroom, the N gain value of learning outcomes is moderate (0.40) and learning interest is still low (0.24). This is in accordance with the research conducted, it can be concluded that the reason for the low interest in learning in classrooms is because the teaching media used does not display enough images and the content of the material being explained so that students are still confused. In classrooms, learning interest is still low because the teaching media used is a whiteboard so that students are less interested in the lessons given. Based on these results, the guided inquiry model can influence students' interests and learning outcomes as well as improving students' interests and learning outcomes. This is in line with Firmanda and Novita's research (2022) which mentions that guided inquiry learning has improved learning outcomes and interest.

From the results of the normality test using the Chi Square test, the X^2 calculated value on the pretest and posttest data in the experiment and control classes is smaller compared to X^2 table so that the data is normally distributed, as well as the X^2 calculated value on the initial and final interest data in the experiment and control classes is smaller compared to X^2 table so that the data is normally distributed. Then in the Homogenity test with a significance level of $\alpha = 0.05$, the pretest and posttest values in the eeksperiment and control classes are shown in the Fcount value < Ftable so that the Homogenous data is shown, as well as the initial and final interest values in the experiment and control classes are shown in the Fcount < Ftable so that the Homogenous data is shown. If the data is already normally distributed and Homogenous , then a hypotesis test will be carried out.

In the first hypothesis test that tcount> ttable so that Ha is accepted and H0 is rejected. For tcount 9.60 is greater than ttable 1.67. Based on the results of the test, it can be concluded that there is an effect of the application of guided inquiry learning movement development on improving the learning outcomes of class X students on the subject of chemical bonds. According to previous research conducted by Sulistyaningsih et al. (2020), the application of guided inquiry learning movement development has an effect on improving student learning outcomes, especially on the subject of chemical bonds. This opinion is in line with the research conducted by Murningsih et al. (2016) which states that guided inquiry learning activities applied in class can improve students' achievement and learning outcomes on the subject of solubility and solubility product. This is reinforced by Azizah et al.'s research (2023) which states that the application of guided inquiry learning activities can improve students' cognitive learning outcomes on the subject of chemical bonds.

In the second hypothesis test to see students' learning interest at the beginning and

end of the lesson, a questionnaire distribution was carried out and then filled in directly by the students. The criteria for the second hypothesis test are tcount > ttable so that Ha is accepted and H0 is rejected. Based on the data and calculations obtained, the tcount value (5.60) is greater than the ttable value (1.67). The results of the study can be concluded that there is an effect of the application of the Guided Inquiry learning movement on increasing the learning interest of class X students on the subject of chemical bonds. This is supported by Firmanda and Novita's research (2022) which mentions that guided inquiry learning has improved learning outcomes and interest.

In the Hypothesis III test to determine the existence of a correlation between students' learning interest and students' learning outcomes, the criteria for the Product Movement correlation test were used, namely tcount > ttable so that Ha was accepted and Hov was rejected, which means that there is a relationship between the two variables. In the study for N = 30, tcount (0.624) > ttable (0.389) was obtained and the coefficient of covariance was 38.91% and 61.1% was caused by other factors, so that Ha was accepted and H0 was rejected. It can be concluded that there is a positive linear relationship between learning interest and student learning outcomes taught using guided inquiry learning models on chemical bonding subjects in grade X. This is supported by previous research, namely according to Karina et al. (2017) who said that having learning interest has been proven to improve student learning outcomes in classroom learning.

▪ CONCLUSION

Based on the results of the research that has been conducted, it can be concluded that there is an influence of the application of the guided inquiry learning model on increasing the interest in learning outcomes of class X students on the subject of chemical bonds, and there is a significant correlation between student learning interest and learning outcomes of class X students using the guided inquiry learning model on the subject of chemical bonds.

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