

**EFFECT ON INQUIRY LEARNING MODEL STUDENT LEARNING OUTCOMES OF
THE SUBJECT MATTER OF TEMPERATURE AND IN CLASS X
CALORIFIC SEMESTER II SMA SWASTA IMELDA MEDAN
A.Y 2016/2017**

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Abstract

This study aims to determine the effect of inquiry learning model to the learning outcomes of students in the subject matter of temperature and heat in SMA Swasta Imelda Medan A.Y. 2016 / 2017. Type this research is quasi experiment. The population in this study were all students of class X Semester II, which consists of three classes. Sampling was done by cluster random sampling. By taking two classes of third grade at random, that is class X-1 as the experimental class using inquiry learning model and a class X-2 as the control class using conventional learning, each of which amounted to 32 people. The instrument used was a test of student learning outcomes that are 20 questions in the form of multiple choice and activity observation sheet. Hypothesis testing using t test with level $\alpha = 0,05$. Result initial testing with pre-test values obtained average pretest experimental class is 48.28, and the average value pretest control class is 44.53. Pretest data testing through the second sample normality test showed normal distribution. In the homogenous eity test obtained $F_{count} = 108$ and $= 2.37 F_{table}$ so $F_{hitung} < F_{table}$ then both samples come from a homogenous ous group. The results of data analysis of test two parties obtained $t_{count} = 1.962 < t_{table} = 1,999$ so that H_0 accepted to mean both classes of the samples had the same initial capability. The average value postes experimental class and control class $= 71.41 = 62.50$. The results oft test analysis of the obtained $t = 3.835$ and $t_{table} = 1.667$ so $t_{hitung} > t_{table}$ then H_0 rejected and H_a accepted means there is significant influence inquiry learning model to the learning outcomes of students in the subject matter of temperature and heat in the tenth grade second semester SMA Swasta Imelda Medan A.Y 2016/2017.

Keywords: Student learning, Inquiry, Student activity

PRELIMINARY

The development of Science and Technology (Science and Technology) currently resulted change the mindset of a nation toward a better direction in the field of education.

Science and technology very rapidly at this time requires all parties, especially the Institutions to improve and develop the national education system in order to create skilled and qualified human, especially in the field of education.

The role of the teacher in the learning process is very important, as Slameto (2010) states that: "the role of teachers has increased as a teacher, became a director of the steering learn". The duties and responsibilities of teachers to be more increased, so the teacher demanded to design a creative learning and innovative ways to get the maximum learning output mainly on physics lesson.

Based on the results of a preliminary study in SMA Swasta Imelda Medan with observation instruments questionnaires and interviews were distributed to 32 students of class X-A SMA Swasta Imelda Medan showed

43.75% (14 people) of students do not like physics lesson and 56.25% (18 votes) regard physics as a difficult subject and less attractive. The questionnaire results also showed 37.5 (12) students do not read the guidebook physics before learning takes place. The school physics teacher also shows the value of physics students in one class X, obtained 51.43% (18) scored below the minimum competency mastery (KKM), with the acquisition of the lowest value of 64.

Teacher-centered learning is learning that restrict students to find their own information and knowledge. Learning activities should enable the student's work, both physically and mentally so that learning becomes meaningful. Student involvement in obtaining the information can be done through scientific activities are often called the activities of inquiry. Scientific activity brings students directly involved in the circumstances of a search of information, and solve the problem by himself mupun group. The process of scientific activities to train students skilled in the process of finding and ultimately these

skills to guide students on an innovative learning experience.

Inquiry learning model is a series of learning activities that involve maximally throughout the student's ability to search and investigate in a systematic, critical, logical, analytical, so that they can formulate their own findings with aplomb. Inquiry learning is designed to engage students directly into a relatively short time. Schlenker research results, in Joyce and Weil shows that exercise can improve the understanding of scientific inquiry, productive creative thinking, and students become skilled in obtaining and analyzing information.

The purpose of this study are: (1) To determine the learning outcomes of students in the subject matter and Heat temperature by using models of inquiry learning in class X Semester II in SMA Swasta Imelda Medan A.Y 2016/2017. (2) To determine the learning outcomes of students in the subject matter and Heat temperature by using conventional learning models in class X Semester II in SMA Swasta Imelda Medan A.Y 2016/2017. (3) To determine the increased activity of students using the inquiry model in the subject matter of Temperature and Heat in class X Semester II SMA Swasta Imelda Medan A.Y 2016/2017. (4) To find a significant effect of the use of inquiry model to the learning outcomes of students in the subject matter of Temperature and Heat in class X Semester II SMA Swasta Imelda Medan A.Y 2016/2017.

The reason the use of models inquiry by Sumantri M and Johan P (2000) The development and advancement of science that is rapidly along with the development and progress of science rapidly, teachers are required to be creative in presenting the learning so that students can master the knowledge in accordance with the development and progress of science pengetahuan .In addition to learn not only from the school, but also of the environment. This inquiry model can help teachers instill that understanding. This model invites students to learn independently without the guidance of a teacher, as students are required to develop the skills obtained from lingkungannya to find a concept in learning. Furthermore, the inquiry model also train students to have their own awareness of learning needs. Because this model stressing the involvement of the students find a concept of learning ability.

RESEARCH METHODS

This research is quasi- experimental research. This research has been conducted in SMA Swasta Imelda Medan, Bilal Ujung street Medan No. 24, Pulo Brayan Darat 1, Medan Timur, Medan, North Sumatra in the academic year 2016/2017 second semester of class X in January-February 2017. The population in this study were all Private high school students of class X Imelda A.Y field in the second half. 2016/2017, amounting to 3 classes of 102 students. Samples were taken from two classes by means of cluster random sampling. One class used as an experimental class of 32 students is class taught through inquiry learning model and one more class used as the control classes of 32 students that classes taught by conventional models. The variables in this study there are two types, namely the independent variable and the dependent variable. The independent variables are variables that can be manipulated or can be used as a type of treatment, while the dependent variable is the result of the result of the influence of the independent variables. In this study may be explained that: As an independent variable, namely the inquiry learning model and conventional learning. As the dependent variable, namely the student learning outcomes of the subject material temperature and heat. The study involved two classes are treated differently. To know the physics student learning outcomes is done with a test for both classes before given treatment (pretest) and after treated (post-test). The design of this study as follows:

Table 1 : Two Group Pretest-Posttest Design

Class	Pretest	Treatment	Posttest
Eksperiment	O ₁	X ₁	O ₂
Control	O ₁	-	O ₂

Information :

X₁ = Inquiry Learning Model

- = Learning Model Conventional

O₁= pretest given the experimental class and control class before treatment. The test is given in the form of achievement test in the subject matter of temperature and heat.

O₂= Posttest administered after treatment in experimental class and control class.

RESULTS AND DISCUSSION

Description pretest data Classes and Class Experiment Control

The study involved two groups of samples. Both classes are given pre-test sample

in the form of 20 multiple choice questions with temperature and heat the material to see the beginning of students' abilities. From the tests conducted, the obtained data is pretes as in the table below.

Table 2 Summary of Data pretest Experiment Class and Control Class

Class Experiment			Class Control		
Value	Frekuensi	Average	Value	Frekuensi	Average
30-36	5	48,28	25-31	5	44,53
37-43	6		32-38	6	
44-50	9		39-45	7	
51-57	5		46-52	6	
58-64	4		53-59	5	
65-71	3		60-66	3	
n = 32			n = 32		
SD = 10,60		SD = 11,02			

From the table above it can be concluded that the average pretest score in the experimental class did not differ much from the average value of the control class pretest. The apparent discrepancy in frequency in some interval value that indicates the experimental class is higher than the control class. Pretest value differences in both classes is not significant where the average pretest score in the experimental class was 48.28 and in the control class was 44.53 with the same number of students in both classes.

Comparison of the average pretest score in the experimental class and control class in detail can be seen in Figures 1 and 2 pretest value distribution charts below:

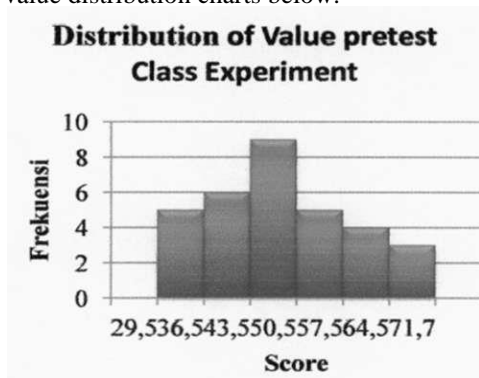


Figure 1 Distribution of value pretest Class Experiment

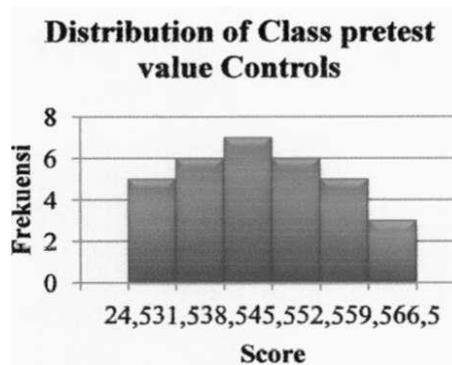


Figure 2 Distribution of Class pretest value Controls

From the graph above, can be seen at every interval value of the difference frequency niklai student scores. Values from 43.5 to 50.5 in the experimental class numbered 14 people, while the control class from 38.5 to 45.5 amounted to 13 people. It shows about students' abilities.

Value Average, Variance and Standard Deviation Values pretest The average value, variance and standard deviation in detail the pretest value presented in the table below.

Table 3 Nilai average, Variance and Standard Deviation

No	Data	Average	Varians	Standard Deviation
1.	Pretes Class Eksperiment	48,28	112. 27	10,60
2.	Pretes Class Control	44,53	121. 55	11,02

The results of the pretest value have been obtained subsequently calculated with Lilliefors test to see whether the data used for the next normal or not can produce accurate research data. Below is a summary table 4 that the test for normality in the experimental class and control class.

Table 4 Ringkasan Uji Normalitas Data Pretes

Class	Data Pretest		Conclusion
	Lcount	Ltable	
Fksperimen	0,1261	0,1566	Normal
Kontrol	0,1489		

Based on the comparison of the value of Lcount and Liable which has been obtained as the table above where the experimental class $Lcount < Ltable$ ($0.1261 < 0.1566$) and so is the control class with $Lcount < Ltable$ ($0.1489 < 0.1566$) so it can be concluded that both classes of data pretest is a normal distribution Homogenous eity Test Data pretest.

Tests conducted to determine the homogenous eity of the sample class derived

from a homogenous eous population or not, that means either the experimental class and control class to represent the entire population. Testing homogenous eity of data is done by F test, homogenous eity test summary pretest value can be seen in the table below.

Table 5 Summary Homogenous eity Test Data Value pretest

No.	Data	Varians Fcount	Ftable	Conclusion
1.	Pretes Class Esperiment	112, 27		
2.	Pretes Class Control	121, 55	1,08	2,3 7 Homogenous

Treatment

After being given a pre-test, the researchers gave the treatment to the experimental class by teaching inquiry learning model correspond to deploy Learning Plan (RPP), which was created.

Based on the data in the table above which shows that the value of F count <Ftable indicate both classes sampled is homogenous eous. This is shown by a comparison that $1.08 < 2.37$, making it the second grade sample representative of the total population declared that there

The similarity test average pretest (test t Two Parties)

Test two parties conducted to determine the similarity of the initial capabilities of students in the experimental class and control class. Below is a summary table calculation equality test average class pretest in both samples.

Table 6 Summary Calculation Test Similarity average pretest

No	Data	Average t _{count}	t _{table}	Conclusion
1.	Pretest Class Eksperiment	48,28	1,96 2	1,99 9 Student initial ability both of sample classes was same
2.	Pretest Class Control	44,53		

Table 6 shows that the calculation of the similarity test average value pretest experimental class and control class for a = 0.05, tcount < ttable (1,962 < 1,999). Based on the above results it can be concluded that Ho is accepted so that it can be said initial ability of students in the experimental class and control class is the same as before given treatment, earlier. Class control are not given treatment, because of the teaching in the classroom

teachers of control is that the conventional learning.

The learning process implemented last for 3 x 45 minutes in one week. Learning that takes place during the study using 4 RPP to discuss the material temperature and heat, RPP in both classes differ in terms of preparation steps according to the model applied learning that is inquiry and conventional learning. Each is equipped with experimental class RPP Student Worksheet (LKS) carried out in the classroom at each meeting. LKS is divided into 4 sub material that is temperature and expansion, heat and changes in states of matter, the principle of black and heat transfer. LKS students worked in groups, comprising five groups where each group consists of 6 students is heterogeneous.

The detailed assessment worksheets experimental class can be seen in Figure charts LKS votes experimental class below:

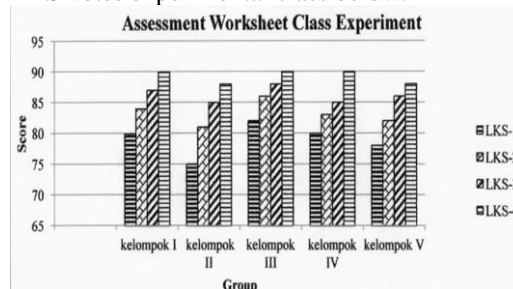


Figure 3 Assessment Worksheet Class Experiment

Activities in worksheets prepared by the investigators as required by the syllabus the students' understanding of the material temperature and heat. LKS lead students to find knowledge in groups. Researchers divided the students into five groups and each group consisted of 6 students. In the diagram above it can be seen that an increase in the value of LKS each meeting. This suggests that the ability of students to plan experiments, stringing tool, make observations, process data and concluded, have increased each cycle of meetings. Based on that data the skills of students has increased in doing LKS 1 with an average of 79 increased to 83.2 in LKS 2 on LKS 3 increased again to 86.2 and reached an average of 89.2 on LKS 4. Workmanship LKS guided by the teacher to minimize errors of students in performing experiments. Provision of this LKS is expected to assist students in understanding the subject matter directly to trial. LKS workmanship is also useful to look at changes in attitudes, and skills of students in the learning process.

Assessment Activities Student Class Experiment

At the time of the learning takes place researchers and observers to observe the behavior of students as needed based on the indicators in the assessment of student activity observation sheet.

Student activity assessment was conducted to determine the development of student activities at each meeting during the study. Aspects considered are: 1) Visual; 2) Oral; 3) Listening; 4) Motor; 5) Mental. Each aspect is given a score of 1 to 3, with the guidelines on student activity observation sheet. Classically an increase of the activity of students in each cycle of meetings. In detail the development of the activity of students in the experimental class can be seen in Fig Activities Grade Experiment below:

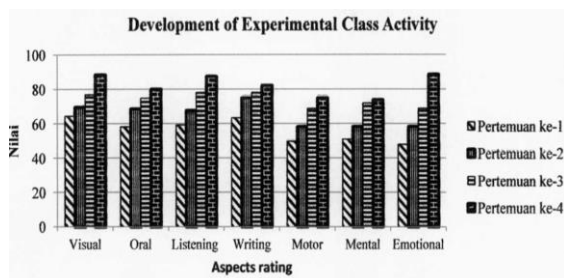


Figure 4 Development of Experimental Class Activity

After the observation, the value of the average activity of students in the experimental class at 69.45. Based on the above bar chart on each aspect of increased activity is marked by the graph in each meeting. Assessment of visual activity increased with an average of 75.00 that are in either category, an average of 70.57 with oral namely either category, an average of 73.18 with a listening that is both categories, the average writing is 74.74 either category, an average of 62.99 with a category of motor well, averaging 63.80 with the category of good mental, and emotional 65.89 with both categories. Thus, we can conclude an increase in activity of students at each meeting.

Postes Data Description Experiment Class and Class Controls

After learning during four meetings has been completed at the experimental class and control class, second class postes further provided that a number of multiple-choice tests are the same as the pretest. Summary of average value data postes in second grade sample can be seen in the table below

Table 9 Summary of Data Postes Experiment Class and Class Controls

Class Eksperiment			Class Control		
Value	Frekuensi	Avérage	Value	Frekuensi	Avérage
40-48	2		35-43	2	
49-57	3		44-52	6	
58-66	6		53-61	8	
67-75	8	71,41	62-70	7	62,50
76-84	7		71-79	5	
85-93	6		80-88	4	
n = 32			n = 32		
SD = 13,03			SD = 13.26		

Based on the data in the table above 4 in the greatest frequency in the experimental class is in the interval 67- 75 value is a number of 8 students in the class while the control is in the interval 53-61 value is a number of 8 students. This indicates that the learning outcomes of students in the experimental class is better for four sessions compared with the control class. In detail the data posttest in the experimental class and control class can be seen on the charts 4 and 5 below.

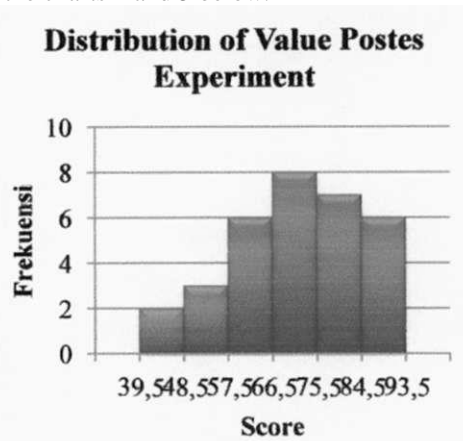


Figure 4 Distribution of Value Postes Experiment

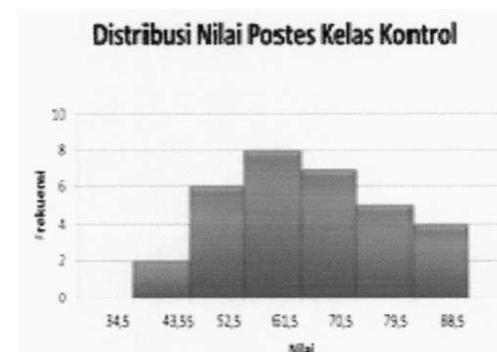


Figure 5 Distribution of Value Postes Control

From the graph above, can be seen at each interval value are the of students. Students

in the experimental group was superior to the control class. This can be seen at the height of the graph dominates of the experimental class in the interval from 75.5 to 93.5 value amounted to 21 people, while the control class in the interval from 79.5 to 88.5 value amounted to 9 people. This suggests that an increase in the experimental class learning outcomes after treatment granted inquiry learning model

Test Similarity Average Value Postes (t test One Party)

Party t test is used to determine the effect of treatment is the use of inquiry learning model the learning outcomes of students in the experimental class. In the table below can be summary calculation hypothesis testing the experimental class and control class is as follows:

Table 10 Summary of Hypothesis Testing Data Postes

No. Data	Average	t_{count}	t_{table}	Conclusion
1. Postes Class Eksperiment	71.41	3,835	1,667	There was a significant effect of inquiry learning model to student learning outcomes
2. Postes Class Control	62.50			

Based on the hypothesis test calculation as at 4: 15 above results showed that the value of post-test, $t > t_{table}$ is $3.835 > 1.667$, then H_0 is rejected and H_a accepted in other words that there is a significant effect of inquiry learning model to student learning outcomes.

DISCUSSION

The results of the experimental class pretest value obtained average value 48.28 and the average value of the control class is 44.53. After being given a different treatment that the experimental class were treated using a model of inquiry learning in class while the control treated using conventional learning models. After being given a treatment both class is given final test (post test) to see their difference in the treatment effect is different learning. It can be seen from the average yield of the experimental class postes obtain an average value of 71.41 with a standard deviation of 13.03 and 169.73 variance. While the average value posttest control class 62.50 with a standard deviation of 13.26 and 175.81 variance. The results of hypothesis test to post-test using the t test of the parties at significant level $\alpha = 0.05$ obtained $t > t_{table}$ is $3.835 > 1.667$, which means that there is a difference in

student learning outcomes using model of inquiry learning with conventional learning models and concluded that the inquiry learning model has advantages

Improving student learning outcomes in class experiment is due at the time of the learning process by using a model Inkuri using animation media are given worksheets that contain various issues related discussion in everyday life appropriate learning materials and students are required to cooperate in solving the discussions and find out for yourself information relating to the matter of discussion. Compared to conventional learning, students learn more listening in class and carry out the task if given practice questions to students. Conventional teaching system carried out in the learning process by using a lecture, question and answer, and at the last meeting of teachers give assignments so that students felt bored, passive and easy to quickly forget.

In the use of inquiry learning model students interest and emphasis on participation and activities of the students to find their own material or information that lessons will be learned through the materials provided. Unlike the case with conventional learning model with the teacher's position as a major regulator of student activities. Students simply a recipient of information from teachers and more teachers give explanations or lectures make students only passive, in other words, the learning process is only one way.

Inquiry models can provide opportunities for students to explore collect and analyze data to solve the problem, so that students are able to think creatively, expressing an opinion (critical), has a curiosity in finding alternative solutions to problems that occur in the environment of students. Students then in this case the active and enthusiastic to cooperate with friends in the group in resolving the problems which have been given by researchers. Students are also interested and active during the discussion and issued a different opinion when discussions were held between the groups. In phase I, researchers motivate students by providing learning objectives to be achieved by students and at this stage the researchers gave the problem to the students by providing a simple questions that vary according to the daily lives of students and then researchers formed study groups. In phase II, researchers provide opportunities for students to brainstorm to form hypotheses. In phase III, the researcher guided each group to determine the steps - steps are consistent with the hypothesis that will be

done. In phase IV, the researchers guide each group to gather information to solve the problem discussion contained in LKS. In phase V, researchers give the opportunity to each group to present the results of the processing of the collected data. In phase VI, the researchers guide students in making conclusions.

In this inquiry learning model, there are strengths and weaknesses found by the researchers during the process of learning activities. As for the advantages of this learning model is the increased level of thinking students to solve problems posed and learning activities of students in the learning process can be said to be active in discussions and respond to problems. The disadvantage is the limited allocation of time making it less effective learning model to implement in accordance with the syntax of inquiry learning model and to determine the problems of the material that will be taught in accordance with daily life is not an easy thing. Of - VI syntax of inquiry learning model are the weaknesses researchers in conducting penilitian is in phase - III for the phase - III is designing experiments for when designing pecobaan there partially students each group that actually play around with the tools and materials provided. Besides syntax inquiry learning model that became the limitations of researchers is the lack of experience of researchers managing the class so that students noisier conditions led to research into less efficient.

Previous research conducted by Sari, S.R in 2013, the results of her research is using a model of learning physics Inquiry on effect on learning outcomes and student learning activities. Then, based on the results of research and hypothesis testing can be seen that the average student learning outcomes in experimental class is higher than the control class, mean results of studying physics using inquiry learning model is higher than in conventional learning, so that it can be concluded that there is influence significantly from the use of inquiry model to the learning outcomes of students in the subject matter and Heat temperature class X Semester II in SMA Swasta Imelda Medan T.P 2016/2017.

CONCLUSION

1. The results of student learning using inquiry learning model in the subject matter and the heating temperature in the second semester X class SMA Swasta Imelda Medan A.Y 2016/2017 with an average of 48.28 pretest and post-test

average of 71.41 students by category good.

2. The results of student learning using conventional learning models in the subject matter and the heating temperature in the second semester X class SMA Swasta Imelda Medan A.Y 2016/2017 with an average of 44.53 pretest and post-test average of 62.50 students by category enough.
3. Activity student by using the inquiry model in the subject matter of temperature and heat in the second half of the class X SMA Swasta Imelda Medan A.Y 2016/2017 obtained an average score of student activity reached 69.45 with active.
4. There was a significant effect inkuri learning model to the learning outcomes of students in the subject matter of temperature and heat in the second half of the class X SMA Swasta Imelda Medan A.Y 2016/2017 with $t_{count} > t_{table} = ie\ 3.835 > 1.667$ at significant level $\alpha = 0.05$.

SUGGESTION

1. Researchers who want to investigate about inquiry learning model to better engage students in the formation of groups based on the level of students' knowledge spreads so more conducive learning atmosphere.
2. At the time of ongoing lab researchers are still difficulties in the full guide in each group. Therefore, for further research suggested that more active way of guiding students to ask the students about the obstacles faced, motivate, and directed that each student actively discussing.

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