Jurnal Ikatan Alumni Fisika Universitas Negeri Medan
Vol.5 No.2 April 2019
ISSN : 2461-1247

THE EFFECT OF INQUIRY LEARNING MODEL ON STUDENTS' LEARNING OUTCOMES ON TOPIC MEASUREMENT

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ABSTRAK

Penelitian ini bertujuan untuk mengetahui apakah: 1) ada pengaruh inkuiri dan model pembelajaran konvensional terhadap hasil belajar siswa, 2) ada pengaruh jenis kelamin terhadap hasil belajar siswa, 3) ada interaksi antara model pembelajaran dan gender pada hasil belajar siswa. Jenis penelitian ini adalah Quasi Experiment Research yang dilakukan di SMA Negeri 9 Medan. Teknik pengambilan sampel yang digunakan adalah random sampling. Kelas eksperimen yang dipilih X IPA 3 dan kelas kontrol yang dipilih X IPA 4 yang masing-masing kelas terdiri dari 30 siswa. Instrumen yang digunakan untuk mengukur hasil belajar siswa adalah posttest dalam bentuk pilihan ganda sebanyak 20 pertanyaan. Teknik analisis data adalah ANOVA dua arah. Dari analisis data kelas eksperimen dan kelas kontrol diperoleh skor rata-rata posttest di kelas eksperimen adalah 79,17 dan skor rata-rata posttest di kelas kontrol adalah 71,83. Kemudian hasil penelitian yang diperoleh: 1) $F_{hitung} > F_{tabel}$ yaitu 15,62 > 4,01 sehingga H_0 ditolak dan H_1 diterima yang artinya ada pengaruh inkuiri dan model pembelajaran konvensional terhadap hasil belajar siswa, 2) $F_{hitung} > F_{tabel}$ yaitu 8,57 > 4,01 sehingga H_0 ditolak dan H diterima yang berarti ada pengaruh jenis kelamin terhadap hasil belajar siswa, 3) $F_{hitung} > F_{tabel}$ yaitu 11,69 > 4,01 sehingga H_0 ditolak dan H_1 diterima yang berarti bahwa ada interaksi antara model pembelajaran dan jenis kelamin pada hasil belajar siswa. Jadi dapat disimpulkan bahwa model pembelajaran inkuiri memiliki efek yang lebih baik dari pada model pembelajaran konvensional pada hasil belajar siswa pada topik pengukuran di kelas X SMA Negeri 9 Medan.

Kata kunci: *Model Pembelajaran Inkuiri, Jenis Kelamin, Hasil Belajar Siswa*

ABSTRACT

This study aims to find out whether: 1) there is the effect of inquiry and conventional learning models on student learning outcomes, 2) there is gender effect on student learning outcomes, 3) there is an interaction between learning models and gender in student learning outcomes. The type of this research is Quasi Experiment Research which was conducted in SMA Negeri 9 Medan.The sampling technique used is random sampling. The experimental class selected X IPA 3 and the control class selected X IPA 4, which each class consists of 30 students. The instrument used to measure student learning outcomes is posttest in multiple choice forms as many as 20 questions. The data analysis technique is two-way ANOVA. From the analysis of the experimental class and the control class, were obtained the average score of posttest in experimental class is 79,17 and the average score of posttest in control class is 71,83. Then the result of research which obtained: 1) $F_{calculate} > F_{table}$ i.e. 15,62 > 4,01 so that H_0 rejected and H_1 accepted which means that there is any effect of inquiry and conventional learning model on students' learning outcomes, 2) $F_{calculate} > F_{table}$ i.e. 8,57 > 4,01 so that H_0 rejected and H_1 accepted which means that there is any effect of gender on students' learning outcomes, 3) $F_{calculate} > F_{table}$ i.e. 11,69 > 4,01 so that H_0 rejected and H_1 accepted which means that there is any interaction between learning model and gender on students' learning outcomes. So it can be concluded that the inquiry learning model has a better effect than conventional learning model on students' learning outcomes on topic measurement in grade X SMA Negeri 9 Medan.

Keywords: *Inquiry Learning Model, Gender, Students' Learning Outcomes*

BACKGROUND

Physics is a science that has an important role in the development of science and technology. Physics has a function to help examine the natural surroundings so that one can develop technology for human well-being. Physics is one branch of Natural Sciences that underlies technology and the concept of living in harmony with nature. As noted by Yuliana, *et al.* (2017:325), physics is one of the subjects belonging to the Natural Sciences and the learning process requires the right method and instructional media. Once the importance of physics to human life is encourages teacher to always try to improve student learning outcomes. In the learning process, children are encouraged to develop thinking skills. According to Sanjaya (2017:30), the learning process is a class directed at the child's ability to remember information, the brain is forced to remember and hoard information without being asked to understand the

information he/she remembers to connect in daily life.

According to Taurina (2015:2626), learning outcomes are described as written statements of what a learner is expected to know, understand and/or be able to do at the end of a period of learning. As per Hartel and Foegeding (2004:69), outcome is very specific statement that describes exactly what a student will be able to do in some measurable way. The low learning outcomes of physics is caused by many things, among others: a dense curriculum, the material on the learning book that is felt too difficult to follow, less effective learning media, inadequate laboratories, less appropriate learning media selected by teacher, less optimal and lack of student alignment itself, or conventional nature, in which the students are not much involved in the process of spreading and liveliness of the class largely dominated by the teacher (Supardi, 2016). One of the problems facing our education world is the weakness of the learning process. Learning done by teachers in this school is still commonplace using conventional learning. Based on interviews with one of the physics teachers at SMA Negeri 9 Medan, students often say that the physics lesson is a difficult and very tedious lesson, so it is not surprising that the value of physics lessons is lower than other lessons. Seen from the average score of daily physics test results at SMA Negeri 9 Medan is still much below the criteria standar completeness where the average score of the student exam is 65 with the value of criteria standar completeness set at school which is 70.

Learning is done by lecture method, question and answer. In new paradigm of learning physics, teacher is a leaders of community learning in the classroom, teachers guide students to be more active in the classroom. The role of teacher is not as a transffering of knowledge, but as a stimulation of learning in order to construct their own knowledge through some activities such as problem solving, reasoning, and communicating. Teacher assist students to understand ideas of physics, and set right the students' understanding if one is incorrect.

The reason for the selection on topics used by the researcher about the measurement is the lack of student knowledge about the measuring instrument, the student does not know the percentage of errors in measurements such as the mistar, calipers, and screw micrometer and the use of the measuring instrument. Students don't know what types and factors are causing errors as well as accuracy, precision and uncertainty of errors.
According to Sanjaya (2017:196), inquiry learning is a series of learning activities that emphasize the critical and analytical thinking process to seek and find out for themselves the answer to a questionable problem. The thinking process itself is usually done through question and answer between teachers and students. Learning by inquiry stimulates students' desire to know, motivates them to continue their work so that they find a solution to the mathematical problems.

According to Sirait and Siaen (2016:5), inquiry learning model is a way of delivering the lesson by examining something that is critical, analytical and argumentative (scientific) by using certain steps toward. According to Smallhorn, et al. (2015), in inquiry learning model students observe a phenomenon, synthesise research questions, test these questions in a repeatable manner and finally analyse and communicate their findings.

In addition to learning strategy factors, gender factors also influence physics learning outcomes. Female students tend to have low motivation in learning physics than male students. It is influenced by the right hemisphere, male students have stronger abilities in numerical and logical fields than in the right hemisphere of female students. Whereas the left hemisphere of female students has advantages in aesthetic and religious fields than in the left hemisphere of male students. According to Wahyudi, *et al.*, (2014: 185), the development of the male right brain is better than the female so that the success of the boy in the exact field is mostly an activity of the right brain.

Based on this background, the researcher conducted a research entitled: "The Effect of Inquiry Learning Model on Students' Learning Outcomes on Topic Measurementin Grade X SMA.

RESEARCH METHODOLOGY

The research was conducted at SMA Negeri 9 Medan The selection of the time of this research Odd Semester Program Academic Year 2018/2019. The population of this research is all of the students grade X IPA at SMA Negeri 9 Medan which consist of 5 classes. the population distribution in that school is done randomly so that the population is homogeneous where each class has the same initial ability and average learning outcomes. The sample of this research is all of the students in class X IPA 3 and X IPA 4. The sample was taken by using simple random sampling and randomized is class in which all class has the same opportunity to be a research sample. According to Sudjana (2009:6), representative samples in the sense of all the characteristics of the population are also reflected in the samples taken. The researcher selected randomly that students in class X IPA 3 as an experimental class who are taught by using

inquiry learning model and students in class X IPA 4 as control class who are taught by using conventional learning model in which each class consists of 30 students.

Type of this research that used by researcher is quasi-experimental design with a 2x2 factorial design. According to Sugiyono (2016:77) said that quasi-experimental is this design has a control group that can not function fully to control the outside variables that affect the implementation of the experiment and this design is used because in reality it is difficult to get the control group used for the research.

Table 1. Research design

Group	Treatment	Postest
Experiment	X	O_1
Control		O_2

Source: adapted from (Sugiyono, 2016:76)

Explanation:

X = giving treatment using inquiry learning model

O_1 = giving post-test in class which is taught inquiry learning model

O_2 = giving post-test in class which is taught conventional learning model

Table 2. Weiner Linkage between Independent and Dependent Variables

Gender [B]	Learning Model [A]		∑B
	Inquiry	Conventional	
Male	Y_{11}	Y_{21}	Y_{10}
Female	Y_{12}	Y_{22}	Y_{20}
∑A	Y_{01}	Y_{02}	Y_{00}

Y_{11} = the learning outcomes of male students who are taught by using the inquiry learning model

Y_{12} = the learning outcomes of female students who are taught by using the inquiry learning model

Y_{21} = the learning outcomes of male students who are taught by using the conventional learning model

Y_{22} = the learning outcomes of female students who are taught by using the conventional learning model

Y_{01} = the number of students' learning outcomes who are taught by using the inquiry learning model

Y_{02} = the number of students' learning outcomes who are taught by using the conventional learning model

Y_{10} = the number of learning outcomes of students who have male gender

Y_{20} = the number of learning outcomes of students who have female gender

RESULT AND DISCCUSION

Result of Research

Research on students' learning outcomes has been conducted at SMA Negeri 9 Medan. Population was all students grade X at SMA Negeri 9 Medan in academic year 2018/2019. Classes selected were X IPA 3 as experimental class is taught by using inquiry learning model and class X IPA 4 as control class is taught by using conventional learning model which each class consists of 30 students. This study was conducted 4 times meeting with details of 2 meetings to give treatment and 2 meetings to give post-test. Then before carrying out data analysis, the two classes are grouped by gender, namely students who are male and female. Detailed data processing is not presented, but the complete data has been processed and can be seen in the attachment. The following data distribution of male and female gender students is presented in table 3.

Table 3. Data of Students' Learning Outcomes that are Combined with the Treatment of Learning Model and Gender

Gender (B)	Learning Model (A)							
	Inquiry(A_1)				Conventional (A_2)			
Male (B_1)	85	90	80	80	70	75	70	70
	70	85	80	95	65	85	70	75
	95	80	90	85	70	65	70	55
	85	85	90		80	75		
Female (B_2)	65	60	70	75	65	60	60	65
	75	65	70	80	80	80	75	80
	80	75	85	75	75	85	80	65
	70	80	75		75	70	65	80

Based on the acquisition of values contained in table 2 above, then the following is the presentation of physics learning outcomes of students who use training and conventional inquiry learning models in the form of bar codes found in Figure 1 below.

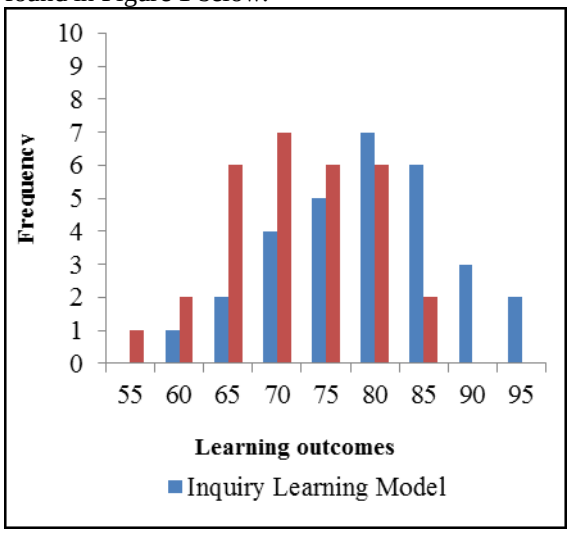

Figure 1. Bar Chart of Students' Learning Outcomes Based on Learning Models

The presentation of student physics learning outcomes in the form of bar chart based on gender, namely between the physics learning outcomes for male students and female students is found in Figure 2 below.

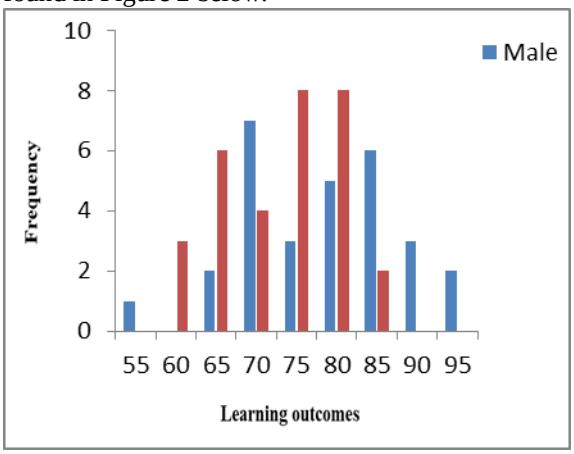

Figure 2. Bar Chart of Students' Learning Outcomes Based on Students' Gender

From the posttest result, the mean score of experimental class with inquiry learning model is 79,17 and the mean score of control class with conventional learning model is 71,83.

Hypothesis testing is done by *Analysis of Varians* (ANOVA) test 2x2 Factorial at $\alpha = 0,05$ with criteria $F_{calculate} < F_{table}$, then H_o rejected. Based on the calculation of the hypothesis test the students 'physics learning outcomes data are presented in (Appendix 9), it is concluded that there is an interaction between the learning model and the gender of students towards the students' physics learning outcomes. The following is a table listing the results of ANOVA test of students' physics values.

Table 4. ANOVA Summary for Hypothesis Testing

Source of Variance	$F_{calculate}$	F_{table}	α
Between column (Ak)	15,62	4,01	0,05
Between row (Ab)	8,57	4,01	0,05
Interaction (I)	11,69	4,01	0,05

Based on Table 4.6 above, for the varian of between column (Ak) obtained that $F_{calculate}$ = 15,62 and F_{table} = 4,01 so seen $F_{calculate} > F_{table}$ i.e. 15,62 > 4,01 so that H_0 rejected and H_1 accepted which means that there is any effect of inquiry and conventional learning model on students' learning outcomes. For the varian of between row (Ab) obtained that $F_{calculate}$ = 8,57 and F_{table}= 4,01 so seen $F_{calculate} > F_{table}$ i.e. 8,57 > 4,01 so that H_0 rejected and H_1 accepted which means that there is any effect of gender on students' learning outcomes. For the varian of column and row interaction (I) obtained that $F_{calculate}$ = 11,69 and F_{table} = 4,01 so seen $F_{calculate} > F_{table}$ i.e. 11,69 > 4,01 so that H_0 rejected and H_1 accepted which means that there is any interaction between learning model and gender on students' learning outcomes. Based on the results of the research hypothesis testing can be described the interaction between learning and gender models in the following Figure 3:

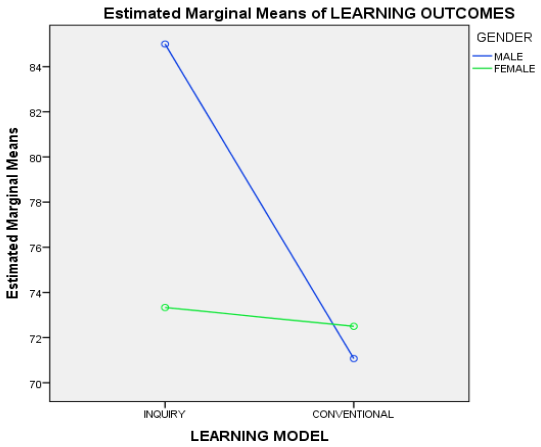

Figure 3. Interaction of student learning and gender model factors on student learning outcomes

Discussion

From the research results obtained, it will be described the discussion of research results descriptively.

From the data of students' learning outcomes, it was obtained that there was an effect of the learning model on students' physics learning outcomes with $F_{calculate} > F_{table}$ i.e. 15,62 > 4,01. It can be concluded that the learning model has an effect on students' physics learning outcomes in the subject matter of measurement with the average students' learning outcomes learned by the inquiry model is 79,17 and students' learning outcomes learned by conventional models is 71,83. From the results of the research that has been done, it can be seen that students' physics learning outcomes are increasing. Improved learning outcomes using inquiry training learning models applied to the experimental class because students are more free to explore existing knowledge. Research conducted by Maxwell *et al*. (2015) also shows that the inquiry model provides an increase in student learning outcomes, attitudes toward physics learning, and increased interest in learning physics. From the data also obtained that there was an effect of the students' gender on students' physics learning outcomes with $F_{calculate} > F_{table}$ i.e. 8,57 > 4,01. It can be concluded that the students' gender has an effect on students' physics learning outcomes in the subject matter of measurement. The students' learning outcomes average of male

students are 78.28 and female students are 72.90 so it can be concluded that students who have male gender give higher average in physics learning outcomes compared to female students. Female students tend to have low motivation in learning physics than male students. It is influenced by the right hemisphere, male students have stronger abilities in numerical and logical fields than in the right hemisphere of female students. Data also obtained from the interaction between learning models and student gender differences in student learning outcomes with $F_{calculate} > F_{table}$ i.e. 11,69 > 4,01. It can be concluded that there is an interaction between learning models with students' gender differences This is supported by a graph of the interaction between the learning model and the gender of students in Figure 1. above, where we can interpret that male students have higher learning outcomes than female students using the inquiry learning model . This is in accordance with the research conducted by Yamtinah, *et al*. (2017) said that male students are better at being scientific especially in observing indicators, controlling variables, and making conclusions, this is directly proportional to the demands of the inquiry learning model in which students are charged to construct their thinking to learn and discover existing concepts. Based on the form of interaction between learning models and students' gender, it can be concluded that teaching using the inquiry model in groups of male students provides the significantly different or shows the highest learning outcomes from students who are taught using conventional learning model. Where the average learning outcomes in students who are taught with the inquiry model is 85.00 while those taught using conventional learning models are 71.07.

While the use of inquiry learning models in groups of female students, giving learning outcomes that are not significantly different even though the learning outcomes are higher with conventional learning models, with average learning outcomes of 73.33 for students taught with inquiry learning model and 72,50 for students taught with conventional learning models.

CONCLUSION

Based on the results of the analysis and discussion, it can be concluded that the application of the inquiry learning model in improving learning outcomes especially for male gender groups of students, this can be seen from the acquisition of learning outcomes and assessment of student activities and there are interactions of these two factors.

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