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THE EFFECT OF INQUIRY TRAINING MODELS USING INTERACTIVE MULTIMEDIA TOWARD STUDENTS LEARNING OUTCOMES

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Abstract - This research aims to determine the effect of inquiry training models using interactive multimedia to the physics learning outcomes students of SMA Negeri 21 Medan. Samples were taken using the probability sampling where the experimental classes were applied to the inquiry training models using interactive multimedia while the control class implemented Direct Instructional Models. The instruments used in this study consist of 10 questions that are validated using the validity of the contents. The data on this research is quantitative data. Data analysis techniques for testing the hypothesis used in this research use SPSS with the use of different pairs of tests. The results showed that the learning outcomes students with the inquiry training model using interactive multimedia are better than the student learning outcomes taught with the direct instructional models.

Keywords: Inquiry Training, Interactive Multimedia, Student Learning Outcomes.

INTRODUCTION

In fact, education aims to improve human resources, because of the increase in human resources related to the formation of the whole person. This is in line with the educational purpose of law No. 20 Years 2003 on the national education system, which develops the potential of learners to become human beings who have faith and fear of God almighty, noble, healthy, knowledgeable, capable, creative, independent, and be a democratic and responsible citizen. Therefore, it is necessary to do various efforts in order to improve the quality of education in various institutions and institutions especially schools, because the school has a large number in improving human resources through the process of learning to teach. Improving the quality of education at the school level must be improved to produce qualified graduates who are able to compete in the world of education.

According to the Human Development Report version of UNDP in 2017, the rank of HDI (Human Development Index) showing Indonesia's human development Index is ranked at 116 from 189 countries. This result showed a decline from previous years where according to media coverage of (UNDP, 2018), the Indonesia Human Development Index (HDI) in 2016 was ranked 113, down from position 110 in 2015. It shows that the quality of human resources in Indonesia is still far below the average of other countries. This data is in line with (Perkins et al., 2006) stating that the period 2015-2016 the potential position of Indonesia's competitiveness is still ranked at 37 from 138 countries, but for the 2016-2017 period down to the 41, the position of Indonesia is under countries such as Singapore (2), Malaysia, (18) and Thailand (32), this condition has even been long. This should be a special concern for governments in preparing qualified human resources to face the era of global competition.

The heavy points of human resources increase are in the educational environment which is one of the schools where the indicator is related to the efforts to improve the quality of the student learning process. A teaching-learning process is said to be good if the process can generate effective learning activities so that students can actively develop their potential to have the personality, intelligence, and skills needed for Themselves and society. Based on the observation conducted on the students of grade X SMA Negeri 21 Medan Year Lesson 2016/2017 obtained information that the results of the students ' physics learning is still relatively low. This is seen based on the recapitulation of the daily results of only about 50% of students who can be categorized as graduated, with a Minimum Standards of the subject of 75 subjects. The results of these studies can be seen in Table 1.

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Table 1. The Results of Physics Exam Grade X SMA Negeri 21 Medan Period 2016/2017

No.	Score	Criteria	Number of Students	Percent
1.	≥ 75	Pass	16	47
2.	< 75	Fail	18	53

Source: List of data collections from physics teachers SMA 21 Medan

The phenomenon above is thought to occur due to several things, among them because of the creative lack of teachers as educators in varying learning by using the learning media so as to make the process of learning physics that occur one-way information from teachers to students. In other words, the teacher relies heavily on the learning monotonous, questions and answers and assignments. Learning tends to be boring and less appealing to students so as to make the atmosphere of the learning process become vacuum, passive, no interaction and ultimately the students are just reflective, sleepy and make noise in the classroom. Low student learning results due to several factors, among others, because there are still many students who do not understand the physical material. Therefore, teachers should be wise in determining a suitable model that can create a conducive situation and class condition so that the teaching and learning process can take place according to the expected objectives.

The learning process with a Teacher Learning Center approach is like this which then impedes students to build their own knowledge. The purpose of learning science or physics in the 2013 curriculum emphasizes scientific activity. Observing activities, solicit, collect data and information, analyze and communicate conclusions as a key activity in learning where students perform hypothesized testing, designing experiments, taking, processing and interpretation of data and to convey the results of oral or written experiments.

The explanation above clear that the model greatly affects the outcome of learning. If the teacher taught with a model that is not appropriate it will affect the learning of the students who are not good too. Teachers usually teach with a lecture method alone, which will make students bored, passive, no learning interest. Therefore teachers are required to use a variety of learning models that are tailored to the conditions or situations in which learning objectives can be achieved effectively and efficiently, quickly and precisely.

One of the efforts of researchers to improve student learning outcomes is to implement an inquiry training model. The process of finding knowledge using props and experiments in this learning model is considered capable of improving the mastery of physics concepts and student learning outcomes. The use of interactive media in learning to help teachers reduce the concept of mistakes in learning. Teachers as a defining component of the learning process are required to have a number of abilities. One of them is to create a conducive learning atmosphere, for example by choosing the learning media that matches the lesson material.

In the process of learning to teach using media has a quite important meaning. (Williams, Nguyen, & Mangan, 2017) stated technologies media can be effective in supporting student inquiry learning Meanwhile, research conducted by (Rahayu & Poppy, 2017) stated that there is a significant influence by using multimedia-based inquiry training models on the learning outcomes of students. In addition, (Fatmi, 2013) stated that there is a significant influence on the use of multimedia in learning inquiry towards student learning outcomes. Inquiry training previous research that uses the media is also done by(Manalu, Motlan, & Bukit, 2018) and stated inquiry training using media better than conventional learning. The learning model of inquiry training is one of the learning models that emphasize scientific activities (Turnip, Wahyuni, & Tanjung, 2016).

METHODS

This research was conducted in July and August 2019. The population in this study is all students of grade X-MIA SMA Negeri 21 Medan, consisting of four classes, each class consists of 36 students with a total population of 144 students. While the samples in this study were determined by probability sampling. And involving two sample classes with different treatment, the experimental class applied to the learning model of interactive multimedia inquiry training while the class control implements conventional learning which in this case used the direct instructional model. The instruments used in this research consist of 10 questions that are validated using the validity of the contents. The design of the research is Two Group Pretest-Posttest Design as shown in Table 2.

Table 2. Design Research

Sample	Pre-test	Treatment	Post-test
Experiment Class	Y_1	X_1	Y_2
Control Class	Y_1	X_2	Y_2

The hypothesis test conducted a different pair test (T-Test) using SPSS comparing the significance of data output results.

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RESULTS AND DISCUSSION

Research Results

The initial step towards the two sample classes before giving a different treatment is to give the students an initial test to know the initial skills of each student's second class. Then, learning a different class of experiments with inquiry training models using interactive multimedia while the control class with direct instructional learning. Then at the end of the learning process will be given a final test to learn student outcomes. Based on research, the initial test results were obtained (pre-test) and the final test (post-test) for the two sample groups, each of which was 36 students and control 35 students. After that, the calculation is done so that obtained on the average pre-test, post-test and standard deviation as in Table 3.

Table 3. Control Class Data-Experiment

Data	Control Class		Experiment Class	
	Pretest	Posttest	Pretest	Posttest
Average	23,00	70,86	23,05	82,78
Standard Deviation	9,49	8,09	9,20	8,23
Variant	90,00	65,42	84,68	67,78
Highest Score	40,00	85,00	40,00	100
Lowest Score	5,00	55,00	5,00	65,00

Based on Table 3, the average value of the experimental class pre-test is 23.05 with the highest value of 40 and the lowest value of 5.00 and standard deviation 9.20 while the average post-test value of 82.78 with the highest value of 100 and the value 65.00 and standard deviation 8.23. The average value of the control class pre-test is 23.00 with the highest value of 40.00 and the lowest value of 5.00 and standard deviation 9.49 while for the average post-test value of 70.86 with the highest value of 85.00 and the lowest value of 55.00 as well as the deviation Raw 8.09.

Before conducting the hypothesis test, first, test the data requirements using the normality test and homogeneity test. The data normality test can be used to see if the student's pre-test and post-test data is a normal distribution. The test of data homogenization is done to know the two groups of samples derived from the same population or homogeneous. To test the data normality of the students, according to Sudjana (2003) can be done using the Liliefors test. From the result of data calculation of pre-test class experiments and control, classes obtained L_{count} respectively namely 0.130 and 0.131 whereas L_{table} = 0.190. Based on the criteria $L_{count} < L_{table}$ then the pretest data of the experimental class and control class are normal distribution as in Table 4.

Table 4. Pre-test Data Normality Test

Class	L_{count}	Significance	L_{table}	α	Description
Experiment	0,130	0,129	0,190	0,05	Normal
Control	0,131	0,137	0,190	0,05	Normal

Similarly for post-test data of experimental classes and control classes obtained L_{count} respectively i.e. 0.132 and 0.144 whereas L_{table} = 0.190. Based on the criteria $L_{ount} < L_{table}$ then the post-test data of the experiment class and the control class are a normal distribution.

Table 5. Post-test Data Normality Test Results

Class	L_{count}	Significance	L_{table}	A	Description
Experiment	0,132	0,115	0,190	0,05	Normal
Control	0,144	0,066	0,190	0,05	Normal

Based on Table 4 and Table 5, it can be seen that in both class L_{count} the < L_{table}. So that it can be concluded that on pretest data and posttest both classes are of the normal distribution of significance (α = 0.05). Subsequent testing of homogeneity tests was conducted by conducting a similarity test of data variances both pretest data and post-test data. The testing criteria of homogeneity is if the $F_{counts} < F_{table}$, then the experimental class and the control class are expressed homogeneous. Test result data can be seen in Table 6.

Table 6. Test Homogenization of Pretes and Postes Data

Data	F_{count}	Significance	F_{table}	α	Description
Pretest	0,048	0,827	3,49	0,05	Homogeneous
Postest	0,052	0,819	3,49	0,05	Homogeneous

Based on Table 6 can be seen that in both classes $F_{count} < F_{table}$ so that it can be concluded that on pretest data and post-test both classes are homogeneous at the level of significance (α = 0.05).

Hypothesis testing is conducted to find out how effective the inquiry training models are using interactive learning media has an effect toward student learning outcomes. Testing conducted using two-party test with test criteria if $t_{count} \geq t_{table}$, the alternative hypothesis that states inquiry training models using interactive multimedia is better than direct instructional models is acceptable. Hypothesis testing results can be seen in Table 7.

Table 7. Hypothesis Test Results

Data	t_{count}	Significance	t_{table}	α	Description
Learning Outcomes	6,153	0,001	2,024	0,05	Alternative hypothesis is acceptable

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Based on Table 7 obtained t_{count} = 6.153 with the significance of α = 0.001 with t_{table} = 2.024 can be seen that $t_{count} \geq t_{table}$ so that it can be concluded that the inquiry training models using interactive multimedia is better than the direct instructional models at the level of α significance = 0.05.

Discussion

The inquiry training models wanted the students to ask why an event happened, then the students did activities, searched for answers, processed the data logically until finally, the students developed a strategy to discover why a phenomenon can happen. The direct involvement of students in the learning process makes the structure well developed. Based on these direct experiences students can build their opposition from what they see, hear, feel and feel are not from the memorization process. This makes the results of the learning to be better.

The interactive multimedia role used in the learning process can be placed as a tool to clarify learning materials at the time the teacher delivers lessons, raises or raises issues for further study and are solved by the students in the learning process by creating media as a source of questions or stimulation of student learning and as a learning resource for students that means the media is the materials that learners must learn Both individually and in groups. Thus the learning objectives will be achieved.

Direct instructional learning delivered with demonstrations, questioning and assignment methods. Teacher activities in learning as if only transferring the knowledge it has to students. Students are not involved in physical, mental, or environmental learning. Direct instructional models are less able to improve student learning outcomes.

To obtain effective and attractive learning media, researchers use the principles of design learning and media design in developing interactive multimedia. Learning media is developed based on input on the need to analyze the needs of information that developed interactive learning media is needed and can provide convenience for students and teachers as User. A medium can be said to be worthy after demonstrating satisfactory results in achieving a predetermined goal. In this case, the product test is performed in the learning process to determine the effectiveness of the learning. The effectiveness of the media, obtained from the value of student learning outcomes.

During the learning process, students are taught with the inquiry training model to perform the process of measuring the physical magnitudes directly. The learning process becomes an authentic student experience supported by the use of interactive multimedia. The process of collecting data and analyzing data into active processes. There are good interactions between students in groups and between groups. Students actively ask teachers about the experience. The processing of experimental data is much more interesting because there is slick visualization through learning multimedia. Slide-by-slide exchanges are what students are waiting for.

Analysis of experimental data became more directional during the learning process. This is because students understand what will be analyzed by experience and refer to the learning objectives. With good analysis, the conclusion of learning can be obtained by a more precise and more precise process. From the range of processes that students experience can support the cognitive ability of students to develop well. It is evident in the well-resolved tasks and learning outcomes. The results of the students who taught with the inquiry training models received satisfactory results that are demonstrated with better results from the class learning outcomes taught with the direct instructional models. A comparison of the learning outcomes of students taught with the inquiry training models using interactive multimedia and direct instructional models are clearly visible. Students taught with the inquiry training models have direct experience in the lesson so that the results of learning are better than students taught with direct instructional models that receive knowledge from the teacher and memorize them. So that can be concluded the learning outcomes of students taught with the inquiry training models are better than the student learning outcomes taught with direct instructional models.

CONCLUSION

Based on the results of the research, and the discussion can be concluded that the inquiry training models using interactive multimedia have an effect on the physics learning outcome of the student which is taught by inquiry training models using interactive multimedia is better than learning outcomes taught with the direct instructional models.

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