INQUIRY AND BLENDED LEARNING BASED LEARNING MATERIAL DEVELOPMENT FOR IMPROVING STUDENT ACHIEVEMENT ON GENERAL PHYSICS I OF MATHEMATICS AND NATURAL SCIENCE OF STATE UNIVERSITY OF MEDAN OF ACADEMIC YEAR 2016/2017

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ABSTRACT: The aim of this research is to determine if inquiry and blended learning materials can improve student's achievement. The learning materials are: book, worksheet, and test, website, etc. The type of this research is quasi experiment using two-group pretest posttest design. The population is all students of first year who take general physics I of Mathematics and Natural Science Faculty of 2016/2017 academic year. Samples which are taken using cluster sampling techniques are two classes from physics department and two classes form chemistry department where one class for experiment and one class for control class of each department. It was found that student's achievement using these materials is significantly higher than those using conventional materials.

KEYWORDS : *Learning Materials, Inquiry, Blended Learning*

1. INTRODUCTION

The acquisition of knowledge, concepts, and principles of physics, as well as having the skills to develop the knowledge, skills and a confident attitude can be applied in everyday life and a for further education. Therefore the competence of students should embody the three aspects as of the body of knowledge which is cognitive, skill, and attitude. Current study shows that the use of some model of teaching and learning that can increase student's activities increased student's achievement however mostly in cognitive aspect (Murni 2007, Nafiah 2008). The data shows that student's achievement in general physics I Based on the results of the competency test conducted by the Faculty of Mathematics, University of Medan are still very low. These may be due to some factors such as; teaching materials used student has not developed based on competence, learning models used by lectures and students do not facilitate the active learning proses. Instructional materials are materials arranged in a systematic way (Pannen, & Purwanto., 1997) that can be used by both students and lectures. Learning materials are the knowledge, skills and attitudes that should be learned by students to achieve the standard of competence and basic competences. On the other hand, learning models are used to meet competence and learning conditions for both students and lectures. It probably the learning materials are not well prepared and the choice of suitable learning model still fully developed. Efforts of improving the competence of General Physics have been done by Motlan, Sinuraya, & Tarigan (2012) through the development of design methods of inquiry-based blended learning. The results obtained through the validation test design method of inquiry-based blended learning. Based on Mean obtained 71,96 > 70 (score a minimum standard of competence). General Physics Achievement competence resulting from the use of design methods of inquiry berbasai blended learning has reached a score of terminal standard of competence (70) but still in the category enough. Some drawbacks design inquiry-based blended learning method is not equipped with teaching materials inquiry based and website (still using the website on the internet).

Nurhadi (2004) stated: "learning by inquiry learning techniques will encourage students to learn mostly through active engagement with the concepts and principles and encourage faculty to have the experience and conduct experiments that allow finding its own principles". Inquiry method is a series of learning activities that emphasizes the process of thinking critically and analytically to seek and find their own answer to the problem in question. Eggen (2000) states: "The inquiry is a learning method which is structured to educate students how to investigate problems and to give solutions based on facts".

Inquiry-based learning (inquiry) provides an opportunity for students to develop the skills they will need all their learning experiences to resolve problems that may not be obvious solution is needed to deal with change

and challenges to understanding the shape of their investigation to the solution, now and in the future (Learning, 2004). Inquiry method is one method that fits in the learning of science with some advantages such as: (1) create and develop "self-concept", so as to understand the basic concepts and ideas better, (2) help in using memory and transfer the new learning situations (3) encourage to think and work on his own initiative, be objective, fair and open, (4) encouraged to think intuitively and formulate their own hypothesis. (5) gives the satisfaction that is intrinsic, (6) the situation learning process becomes more stimulating, (7) can develop their talents or skills of individuals, (8) gives the freedom to learn on their own, (9) can be avoided from the ways of learning traditional and (10) can give time to sufficiently so that it can assimilate and accommodate the information.

The approach taken may utilize a wide variety of media and technology. Blended learning with the learning process can incorporate a variety of physical and virtual resources (Heinze & Procter (2003). The blended learning is a combination of online learning (e-learning) with face-to-face learning (learning). The implementation of blended learning some of the benefits such as: (a) The learning process does not only face to face, but add learning time for students (learning) by utilizing the virtual world (internet). (b) simplify and accelerate the process of non-stop communication between faculty and students. (c) Students and faculty can be positioned as parties learn. (d) Assist the acceleration process of teaching.

Graham said that in general people (including methods) there are three reasons of using blended learning: (a) to improve education, (b) to give flexible time, and (c) to reduce costs. Blended Learning implementation strategies in the learning activities as follows: Select the device that is easy to use and preferred and Using Video. Based learning Blended Learning is a learning optimization-based e-learning (Singh, 2003), . We know that learning is based on e-learning in theory quite faster than with conventional berabasis learning.

To optimize the design method of inquiry-based blended learning requires the development of inquiry-based teaching materials and blended learning along with other supporting devices. One of the learning strategies that can be used to improve the ability of students to learn physics is using the inquiry method (Gulo, 2002). Some advantages compared to conventional teaching methods, among others (Sanjaya, 2006) that the method of inquiry: (a) embodies cognitive development, affective and psychomotor aspects, (b) provides space for students to study according to their learning styles, (c) facilitates changing behavior with their experience, (d) can serve the needs that have the ability above average. Inquiry learning process not only acts as a receiver lecturer lessons through verbal explanation, but the role is to find their own core of material. Inquiry method can develop thinking skills of students. Thus, this learning method in addition to results-oriented, it will also improve learning process. Therefore, the success criteria for the learning process by using the method of inquiry learning is not determined by the extent to which students can master the subject matter, but the extent to which students search for and find something move through the process of thinking (Sanjay, 2006).

Some research findings that are relevant to the method of inquiry related to physics learning outcome for students at several schools, among others: Juliarti (2007), concluded that student learning outcomes that are subjected to higher inquiry method (64.91) rather than learning outcomes the student group that received conventional treatment methods (60.39). Based on research of Murni (2007), shows that the results of student learning using the inquiry method higher (76,43) rather than using conventional methods (64.57). Likewise, the research findings Nafiah, (2008) n the subject matter vibrations and waves of inquiry learning outcomes through treatment obtained mean is 75.14 and the mean of the class with the conventional method of treatment is 67.28. Kocoglu et.al. (2011) concluded that there was no difference in the content analysis of knowledge between teachers who receive learning blended learning and teachers who receive direct instruction. Winarni (2009) concluded that the results of testing the product development guided inquiry learning model shows that in classical learning completeness students increased by 28% and life-skills of students by 17.66%.

The development of inquiry-based teaching materials and blended learning General Physics is one of urgency and urgent effort performed by a team of General Physics Unimed in accordance with the demands of the 2013 curricuum, where one of the demands of the curriculum is to apply the scientific method. Teaching materials produced can be used by all General Physics Faculty Lecturer Tim Unimed. Inquiry-based teaching materials can enhance critical thinking skills, and creativity of students (Gordon et.al. 2001). Through inquiry learning can improve thinking skills and creativity of student learning. Based learning blended learning can streamline the application proceedings.

2. METHOD

Research carried out quasi experimental study with two groups design pretest-posttest. The sampling used was cluster. This research is to know the achievement of competence in general physics teaching using inquiry teaching materials and blended learning. Teaching materials used have been designed and validated in advance through the stages of development of teaching materials. Data analysis in hypothesis testing using Anova one way.

3. RESULT AND DISCUSSION

From the use of learning materials that have been designed and given to the experimental group can be seen the difference in average achievement of competence that is different than the group with conventional learning shown in Figure 1. In Figure 1 shows a clear difference in the two groups where the average achievement of competence in the experimental group better than the conventional group. This is because in the learning of the experimental group trained in learning that is not only focused on the achievement of competence, but a wide range of competence can be achieved. This is consistent with research Muller et.al. (2009) which shows that research-based inquiry improve the competence of students in school and improve their knowledge in each subject. This can mean the learning materials that have been adapted so students will be trained in achieving a higher level of competence compared to conventional. Without teaching materials tailored trained students are only able to answer the question without the proper training to familiarize students in solving problems exist even use good learning model. This is because students are not familiar with the learning process if the absence of matters related to do constantly to become accustomed.

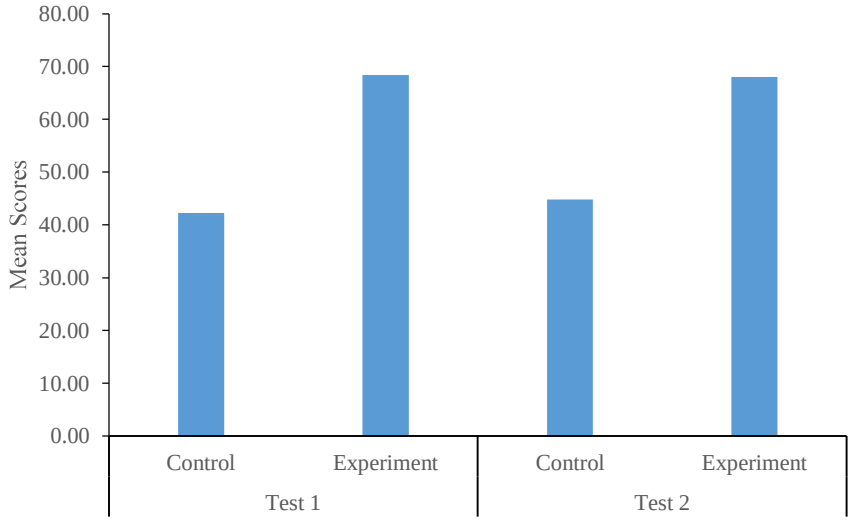

Figure 1. Description of Competence Student Achievement

Table 1. Anova One Way

		Sum of Squares	df	Mean Square	F	Sig.
Test 1	Between Groups	8528.180	1	8528.180	269.254	.000
	Within Groups	1520.320	48	31.673		
	Total	10048.500	49			
Test 2	Between Groups	6728.000	1	6728.000	224.267	.000
	Within Groups	1440.000	48	30.000		
	Total	8168.000	49			

Based on Table 1, it appears that the ANOVA test results showed that for each competency test given to a second sample shows the differences in competency learning outcomes at different levels. This is also due to the presence of appropriate teaching materials Students can find out about the things learned with independence and more support from the reference source is presented with blended learning method. Research Thavavel (2015) learning model Blended Learning greatly assist students in improving the competence of students in the classroom and develop themselves in the art and discipline of students. This is in line with research Gordon (2001).

The different thing is expressed in the research Aldalalah et.al. (2014) showed that there are strong negative relationship between the blended learning and drawbacks. Students who show a shortcoming at the

highest level shows less understanding of the competence. Competence is used to improve the skills, confidence in applying blended learning. There significant improvement even for those students who have slow leaner, therefore they need some training in the learning cycle. We assume that the use of teaching materials based inquiry can help improve the students to be trained in problem solving and finding solutions to problems that exist independently.

Table 2. Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Test 2 & Test 1	50	.994	.000

Table 3. Paired Samples Test of Instrument

		t	df	Sig. (2-tailed)
Pair 1	Test 2 – Test 1	3.771	49	.000

Based on Table 2 and 3 shows the relationship between the two tests are presented in the sample group on the results show the difference was not significant due to the correlation of both tests are different. This is because the tests presented different matter and they are consistent in content that is inquiry. That is to say nothing important factor that can disrupt or cause errors in the calculation of research data obtained due to the mismatch of the material presented in the test is given. It also indicates that a given test have the same quality and can be said to be good in showing the achievements of competency to be determined in this study.

4. CONCLUSION

The conclusion was that there is a difference in the achievement of learning competencies of learning activities conducted by inquiry-based teaching materials and blended learning compared to conventional learning activities without inquiry-based teaching materials and blended learning.

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