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AISTEEL 2016

For the Authors whose article will be published on the index online journal (ex. Google schoolar and others), the committee will facilitate it.

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Important Date:

Abstract Submission Deadline / Received : September 16th 2016 / Deadline Submission
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"Developing Future Teachers' Educational Model"

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Chairman Foreword

The honorable,

- *Professor Peter Charles Taylor, PhD, Director of Transformative Education Research Centre and a Professor of STEAM Education at Murdoch University, Perth - Western Australia*
- *Associate Professor Elisabeth Taylor, PhD, an expert in Curriculum Theory, Peace Education, Science Education at Murdoch University, Perth - Western Australia*
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- *Director of Postgraduate School of UNIMED*
- *Lecturers, researchers, students, all speakers and participants*

Assalamualaikum Wr Wb

Good Morning, *Salam Sejahtera,* Praise to Allah the Almighty for all His blessing, where today we are here to participate in 'The First Annual International Seminar on Transformative Education and Educational Leadership' with the theme "Developing Future Teachers' Education Model".

Ladies and Gentlemen,
This seminar presents a keynote speaker, 5 guest speakers from Australia, Malaysia and Indonesia and 132 researchers covering lecturers, teachers and students with around 860 participants. The researchers come from Manado, Palu, Kendari, Malang, Surabaya, Solo, Bandung, Jakarta, Palembang, Jambi, Batam, Pekanbaru, Padang, Aceh, Medan and North Sumatera.

I would like to express greatest thankful to all colleagues in the steering committee for cooperation in administering and arranging the seminar. Hopefully this seminar will be continued in the coming years with many more insight articles from inspiring research.

Wassalamualaikum Wr. Wb.

Rahmad Husein

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Welcoming Speech of Director of Postgraduate Study State University of Medan

Best wishes for all of us,

First of all thanks to God who has given grace and health to us so that we can assemble this place to attend The First Annual International Seminar on Transformative Education and Educational Leadership (AISTEEL) 2016. This seminar is organized by Postgraduate Study (PPs) of the State University of Medan (Unimed). Welcome to all keynote speakers, researchers, students and, participants.

This international seminar is one of the manifestations of the vision and mission of PPs of Unimed, namely the dissemination and implementation of the results of research and studies related to the community. Therefore we strongly support the activities of this seminar which is also a series of academic activities of Unimed. Through this seminar, the participants will exchange information related to the latest research in the field of Transformative Education and Educational Leadership, which is expected to bring new ideas in solving various problems that arise particularly in the world of education.

In accordance with the theme presented in this seminar "Developing Future Teachers Education Model" it is expected that PPs Unimed can lead and strengthen the future teachers. The goal of transformative education is to develop visionary teachers and teacher educators to be capable of and committed to transforming education systems worldwide so that they prepare citizens with high-level abilities for solving global crises such as internationally political conflicts, climate change and loss of biocultural diversity.

Thank you for all committee to has well organized this seminar. Thanks to all keynote speakers who have attended, presented and shared their ideas on transformative education and educational leadership. Thanks to all researchers, students and participants and hopefully this will be scientific discussion to develop the future education.

Finally, I hope that all academicians and stakeholders of PPs Unimed hand-in-hand to excel our institution to be a world class university.

Best wishes for all of us

Director,

Prof. Dr. Bornok Sinaga, M.Pd

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INFLUENCE BASED LEARNING PROGRAM SCIENTIFIC LEARNING APPROACH TO SCIENCE STUDENTS GENERIC SKILLS

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Abstract - This study aims to determine the influence of scientific approach based learning program (P2BPS) against generic science skills of students. The method used in this research is *quasi experiment* with *two-group pretest posttest* design.The population in this study were all students who take courses in general physics II at the Department of Physics Physics, Faculty of sciences State University of Medan. The sample was determined by random cluster sampling technique. One class as an experimental class taught by the scientific approach based learning program and the class as a class taught by conventional learning control. Data collection techniques using generic science skills test instruments. The results of data analysis showed that students taught with a scientific approach based learning program has a generic science skills better than being taught by conventional teaching. It can be concluded that there is significant influence learning program based scientific approach to generic science skills of students in general physics course II.

Keywords: scientific approach based learning program, generic science skills

1. INTRODUCTION

At present we are in the era of globalization characterized by increasingly unclear boundaries between regions as well as the development of science and technology that is so rapidly taking place exponentially. These conditions provide opportunities and challenges that increases competition among nations in all fields. Countries that are not able to face the competition will be the consumers and the market for products of the more developed countries, especially in the fields of technology and science. In order to adapt to the rapid technological developments in this era of globalization, people must have the ability and essential skills that can be used in various fields of work in the community. Similarly, prospective teachers of physics in order to exist in the face of various challenges must possess skills that are commonly referred to as generic science skills.

Skills are generic science skills necessary for success in all jobs as it includes cognitive ability, personal, and interpersonal. Generic skills is the ability of a combination of knowledge and skills related to cognitive, affective, and psychomotor. The ability does not depend on the domain or discipline but rather refers to the cognitive strategies (Gibb, 2002).

Skills generic science is often also called soft skill, essential skills, basic skills and others [1], [2]. According Brotosiswoyo [3] generic capabilities of science in science teaching can be categorized into nine indicators, namely: direct observation, indirect observation, awareness of the scale of magnitude*(sense of* scale),using symbolic language, thinking in terms of logic obey the principle,perform inference logic means, understanding causal relations, create mathematical modeling and abstract concepts are functional. In physics learning general skills generic science is the ability to think and act students based on scientific knowledge obtained from the study of physics.

Physics as part of the Natural Science is defined as the study of natural phenomena natural phenomenon is memungknkan the investigation by experiment, measurement, and presenting systematically based on the general rules [4]. Physics plays a very important in everyday life. As the study of natural phenomena, there must be a close relationship between the physics of the universe and benefit of physics in explaining the symptoms are indeed to mankind. The main purpose of the study of physics is to develop the capacity for observation and experimentation. Physics is not only the product but also the process of finding, facts, concepts, principles and laws of physics. Besides the physics lessons aimed at developing science process skills [5]. Thus it can be stated that physics is a science that is inductive is the science that is built based on a special deduction of symptoms that exist in nature.

Based on the physical character as described above, investigation and experimentation is the spirit of learning physics. In physics lesson students should be making observations, formulating

hypotheses, conduct experiments, collect data, analyze the data and draw conclusions (AT Collette & Eugene, 1994). Such activity is an activity in a learning-based approach is scientific.

The results of the observations related to the implementation of learning physics, showing that learning physics is implemented in the class have a tendency, among others, (1) less linked with real life, (2) less encouraging students to think creatively and critically , (3) rarely practicing problem solving, and less emphasis on *means values* (process values) [6].

Likewise was the case in general physics teaching in the Department of Physics, Mathematics and Natural Sciences Faculty State University Of Medan. Based on the results of preliminary studies on physics learning is common that professors tend to be implementing learning cooperative learning model. Learning steps associated with this model is to provide duty on certain subject matter, followed by a group discussion as well as the percentage taken up by other groups. Of learning activities designed and implemented by the teaching faculty have not been able to give students an opportunity to perform scientific method to develop a generic science thinking skills. Instructional practices as outlined leads to lower learning outcomes including generic science skills of students.

In order to carry out teaching physical science, physics teacher candidates need to be equipped with generic skills. According to Gibb [7] that the ability of generic science is the basic capabilities required of a physics teacher candidates. For that we need to apply a learning program that prospective physics teachers have a generic science skills. Based on this, researchers interested in conducting further research to analyze the influence of the scientific approach based learning program for learning outcomes physics student teachers in physical education courses State University of Medan.

Program-based learning approach to *scientific* (P2BPS) is a learning program that is designed so that students can construct and find their own knowledge through a series of scientific methods through the stages observe, formulate problems, formulate hypotheses, collect data (do the experiment), process and associate the data, draw conclusions and communicate knowledge found. Learning activities begin with the filing of an authentic real problem is found, seen and experienced by students in everyday life. Sought to solve the problem posed by the investigation group, analyzed and communicated to other students. Learning to give opportunity to the widest students perform various activities, to construct and find facts, concepts, procedural, theories and laws of physics through the process of observing, thinking, ask questions and communicate in situations of physics. Starting with the face of a situation centered on the problem given to to get to the other problems, through investigation, inquiry and problem solving. Event inquiry through experimentation is the spirit of scientific approach based learning program. Experimentation aimed at giving out the opportunity to to perform hypothesis testing or observation of facts and natural phenomena that are related to the concept of physics. Experiments were carried out can be the form of providing experience and can take the form of investigation or inquiry. Experiments form of experience aims to improve understanding of the subject matter. Investigative experiment aims to improve problem-solving abilities. Investigative experiment requires students act as a scientist (scientist). Implementation of the experiment should be able to give an opportunity to students conducting identify problems, formulate questions, formulate hypotheses, planning experiments, conduct experiments, analyze experimental results, report and communicate. All activities in the scientific approach based learning program to develop skills generic science student teachers of physics.

2. METHOD

Research was conducted at the Department of Physics, State University of Medan with a population of all Faculty of Science students who take courses general physics II. The sample consists of two classes is determined by *random cluster sampling*technique.One class as an experimental class (students of physical education class E class of 2015) as many as 39 people are taught the scientific approach based learning program and the class as a control class (class A student of mathematics educationclass of 2015) as many as 43 people are taught with conventional learning is usually done by lecturers. This type of research is *quasi experiment* with the design of *two group pretest-post test* as shown in Table 1.

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Table 1. Research Design

Class	Pretest	Treatment	Posttest
Experiment	T_1	X	T_2
Control	T_1	Y	T_2

Description:
T_1: generic science skills pretest
T_2: Posttest generic science skills
X: Learning physics with P2BPS
Y: Learning physics in the conventional class

Data collection techniques in this study using the test. Before and after learning students are given the generic science skills tests. Instruments generic science skills indicators compiled for direct observation, indirect observation, awareness of the scale of magnitude, symbolic language, obey the principle of logic, inference logic, build concepts, and mathematical modeling. Analysis of data using test requirements analysis and hypothesis testing. Data normality test generic science skills, tested by test. *Kolmogorov-Smirnov* Test homogeneity tested by *Lavene's test of equality error* variance.Analysis hypothesis test to determine the effect P2BPS against generic science skills of students performed with different test mean t-test at a significance level of 5%. Output data analysis using support *SPSS PC21 for* windows.

3. RESULTS AND DISCUSSIONS

3.1.Results

Data pretest and posttest generic science skills of students in the experimental class and control class can be seen in Table 2.

Table 2. Summary of Generic Science Skills Students in Classroom Experiment and control

Aspects	KGS Pretest		KGS Posttest	
	Control	Experiment	Control	Experiment
Top Value	51	49	87	95
Lowest Value	10	12	58	67
Average	30.47	30.21	75.63	81.72

In Table 2 it appears that the pretest KGS grade student experimentation and grade control is not much different and are in the very low category. Data postes KGS experimental class is better than the control class, average KGS experimental class at the high category and KGS control class in the category enough.

The hypothesis testing

Before testing the hypothesis first tested the prerequisite that normality test, homogeneity of variance. Test for normality using the Kolmogorov-Smirnov test showed that the data for the experimental class pretest KGS 0.200 and 0,138 controls, KGS posttest experimental class and control class each has a significance of 0.200. This shows the normal distribution of data KGS. The next test of homogeneity of variance using the test Lavene, obtained sig KGS 0.964 pretest and posttest 0.655 sig. It states that the data variance KGS is homogeneous. Results of different test average pretest KGS experimental class and control class obtained sig 0.895. This shows that the average pretest KGS both classes are uniform.

Hypothesis test results mean KGS posttest with different test average values obtained sig. 0,000 less than 0.05, so Ha is received. These results showed no difference KGS students who are

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taught by P2BPS to those taught by conventional teaching is usually done by lecturers. It can be concluded that P2BPS with supporting device is successful increase generic science skills of students.

3.2. Discussions

Based on the analysis descriptive and inferential known differences in generic science skills of students significantly between classes taught by P2BPS and taught conventionally. Improved science skills of students in the classroom generi P2BPS higher than in a conventional classroom. This is in line with the results of the study [8], [9]. This occurs because of the treatment given in class control is also different. In the experimental class taught by P2BPS, early learning students are invited to observe the facts and concepts through observation. Through observation students perform the search process with respect to the subject matter knowledge through various activities carried out by the process of science as scientistsin conducting scientific investigations. Thus the students are directed to find out for yourself the facts, concepts, and new values necessary for life. Activeness of students in learning to find answers to learning problems arouse curiosity and motivation of students. As the Septin, et al [10] that students who have the motivation to encourage students to seek information from various sources about the things that will be studied and proven through experimentation.

The learning activities aimed at the development of generic skills of science students in acquiring knowledge, discover and develop own facts, concepts, and values required. Observation activities in P2BPS closely related to the real-world context faced by students in everyday life. The process of observing the facts or phenomena include searching for information, see, hear, read, or listened to records observation, such as using a notebook, camera, tape recorder, video recorder, and stationers more to help students develop the ability to observe directly or indirectly, as well as building concept.

Inquiry is an activity that can be in establishing the concept of the student. Learning to be becoming more interesting and exciting if students are given the opportunity to ask each other questions with a friend or with the teacher. Students are introduced directly with facts and concepts learned so raises questions that can optimize the ability of students to develop generic skills. Propose activities to develop generic skills that the process of building the students' knowledge in the form of concepts, principles, procedures, laws and theories, to think metacognitive. Its purpose is to enable students to have a high-level thinking skills*(critical skill* thinking)critically, logically and systematically. Propose activities conducted through various activities eg, discussions and group work and class discussions. Group discussions to give a space of freedom for students to express ideas / ideas with their own language.

Try/collecting useful data to improve student curiosity to strengthen the understanding of concepts and principles / procedures to collect data, develop creativity and skills of scientific work. These activities include planning, designing and carrying out experiments, as well as obtaining, serving, and process data. Experiments can raise awareness of the scale of the student for direct student interaction measuring, comparing the scales in the physical quantity, students gain experience to measure directly or indirectly, be able to observe the relationship between variables, observed a causal link, write observations are symbolic and with mathematical modeling. Through the collection of data in the experiments the students gain experience building a framework obey the principle of logic, inference logic and find that the facts of nature completely obey the principle. [11] states that the generic thinking skills related to the law of causation linking two or more laws, theories or principles in a natural phenomenon. In addition P2BPS application can improve the skills to observe, classify, interpret, predict, hypothesize, plan experiments, using a variety of sources and communicate with other students. Trial events there are several experiments conducted simultaneously, such as controlling and varying variables, take measurements and record data. All of these activities are able to develop generic science skills of students, to foster develop the habit of scientific thinking and acting as a reflection of the mastery of knowledge, skills and scientific attitude of students.

Associate activities in P2BPS aims to build thinking skills and scientific attitude. Data obtained classification created, processed, and found specific relationships. The project is designed by the lecturer through engineered situation in certain activities so that students do activities include analyzing the data, classify, categorize, inferring, and predicting / estimating by utilizing worksheets discussion or practices. The results of activities to try and associate enable the development of generic science skills of students.

Communicating activity is a means and a vehicle to deliver results in the form of verbal conceptualization, writing, drawings / sketches, charts, or graphs. This activity is done so that the student is able to communicate knowledge, skills, and practices, as well as the creations of students through presentations, reports, and / or performance of the work. In P2BPS students can develop the ability to communicate orally and in writing. The ability to communicate in writing is obtained when a student reports an experiment is the ability to communicate verbally obtained when the percentage of students present the experimental results obtained to other students. Criticizing the ideas and findings by others is crucial in learning physics. Scrutiny by others of the mistakes made are incentives that make students more careful and cautious in the future full of challenges [12]. New challenges in the era of globalization, the dynamics of the increasingly complex demands of learning activity is not simply repeat the facts and phenomena of daily life can be expected but is able to reach a new situation which may terjadi.Dengan P2BPS support the advancement of technology and the arts, learning is expected to encourage the students to think up a new situation something unexpected.

4. CONCLUSIONS

Generic science skills of students who are taught by a scientific approach based learning programs better than being taught by conventional teaching. This suggests that learning general physics II with a scientific approach based learning programs affect the increase in generic science skills of student teachers of physics.

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