

Effectiveness of Practical Learning Using ProjectBased Learning Model on MaterialAtomic Structure, Periodic System and Chemical BondingTo Increase Interest and Learning Outcomes Chemistry Student Class XSMA PAB 8 Saentis.

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Abstract : *This study aimed to determine the effectiveness of the use of practicum learning model using the learning model of Project Based Learning to improve learning outcomes and students' learning interest in chemistry. This research was a quasi experimental research with two group pretes - posttest design. The study population were all students of class X SMA PAB 8 Saentis consisting of 2 classes. Samples in this study were taken in total sampling, class X IPA 1 amounted to a class of experiments using learning practicum and Project Based Learning and class X IPA 2 as a control class using conventional class teaching. This research instrument used the test of learning result with the form of multiple choice test as much as 27 item and questionnaire of interest of learning consist of 27 validated questions. The resulting data were analyzed by using 2 lane anava. Based on the research results it was obtained that students' chemistry learning results taught by using practical learning and project based learning model was higher than student learning outcomes taught with conventional teaching learning model. Student learning interest taught by using learning practicum with project based learning is higher than using conventional lecture learning.*

Keywords : *learning model, learning outcames, interest in learning*

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I. Introduction

Along with the rapid advances in science and technology, the world faces many challenges in order to prepare qualified human resources that are expected to compete in a growing community situation. To make it happen, the government has made efforts to improve and improve the quality of education in various types and levels of education, by improving the quality of curriculum and its implementation which aims to form the character and life skills, so that students can become innovative and productive people [1] .

One of the problems in education is the weakness of the learning process. In the learning process, students are encouraged to develop thinking skills. The fact that happens in the process of learning in class, students are directed to memorize information. Students are forced to memorize and store information and apply the information in daily life. This resulted when the children graduate school, they are only smart theoretically but very poor in applying it. Some factors causing the low of chemistry for high school students are: (1) systematic and chemical sequence for students has not been able to motivate students to learn because it teaches lesson material that is difficult without giving the basic attention needed, (2) students often learn (3) the material taught floats so that it can not find the " key " to understand the lesson being studied, and (4) certain teachers are less successful in conveying concepts for students to master the material lessons due to lack of mastery of learning methods [2].

Learning is an attempt by a person to gain a whole new change of behavior, as a result of his own experience in interaction with his environment. The changes must be positive and active and always aim to get something better than before. Active change means that change does not happen by itself but because of individual effort itself. [3] Various problems that occur in the world of education so far is the lack of interest in learning that is owned by students. With low student interest in learning in this case of chemistry learning, resulting in learning outcomes obtained by students also declined.

Interest is a permanent inclination of the soul to notice and remember some activities. Great interest in learning activities. Students will easily memorize lessons that interest him. Interest is closely related to motivation. Motivation arises out of necessity, as well as interest, so it is appropriate that interest is a motivational tool. Learning process will run smoothly if accompanied by interest. Therefore, teachers need to arouse students' interest so that the lessons given are easy for students to understand [4].

Interest spawns spontaneous attention which allows the creation of concentration for a long time thus, interest is the basis for concentration. Interests are very personal, others can not grow in students, can not nurture and develop that interest, and may not be interested in something as a representative of each student [5]. Interest and attention in learning have a very close relationship. Someone who is interested in a particular subject, usually tends to pay attention to the subject. Conversely, if a person is paying attention continuously either consciously or unconsciously to a particular object, it can usually arouse interest in the object. Things that affect the interest of learning can be overcome by teachers by Presenting the material that is designed in a systematic, more practical and presentation has art, it provide stimulus to students to pay high attention to the field of study being taught, Develop regular habits, students physical, Maintain student aspirations, Provide adequate supporting facilities. Some steps to generate interest in learning that Giving attention to the goal to be achieved, About the elements of the game in learning activities, Planning learning activities and follow the plan, Make sure the learning objectives at that time for example; complete homework or report, Get satisfaction after completing study schedule, Be positive in facing learning activities, Train emotional freedom during learning. Another problem in the world of education is the problem of weak learning process. In the learning process, students are encouraged to develop thinking skills. The fact that happens in the process of learning in class, students are directed to memorize information. Students are forced to memorize and store information and apply the information in daily life. This resulted when the children graduate school, they are only smart theoretically but very poor applying it.

Learning model that is considered able to answer the problem about the decreasing interest in student learning and then accompanied by the decline in student learning outcomes is project based learning (Project Based Learning). Project-based learning is a learning model that involves a project in the learning process. Projects undertaken by students can be individual or group projects and are implemented within a certain time period in a collaborative manner, producing a product, whose results will then be presented. Project implementation is collaborative and innovative, unique, focused on solving problems related to student life. Project-based learning is part of a student-centered instructional method. practicum is a way of presenting that lessons and students experiment with experiencing to prove themselves something question or hypothesis learned and as one method of teaching where students do an experiment on a matter, observe the process and get the results of an experiment then the results of the observations were delivered in class and teachers will evaluate.

Practical activities at school can train students into scientific thinkers and have a deep understanding of key scientific concepts. Good scientific thinking means being able to generate questions for investigation, and developing sensible hypotheses, to look for solutions. By using this learning model in a practicum, it is expected to increase interest in learning along with the increase of student learning outcomes. The use of project based learning model in a practicum is expected to maximally involve all students' ability to search and investigate systematically, critically, logically, analytically, so that they can formulate their own discoveries with confidence. Based on research journal written by Gulbahar and Tinmaz in implementing Project Based Learning and E - Portfolio Assessment In an Undergraduate Course shows that Project Based Learning is the right choice in child training, the students also agree that the Project Based Learning member is a good result for their learning. [6] Tarigan in his research on the effectiveness of multimedia usage and practice through the problem-based learning strategy on creativity and student learning outcomes found that student learning outcomes taught by problem-based learning more higher practicum than with problem-based learning using multimedia, as well as the creativity of students who were taught the practicum showed a higher result on learning practicum than with the use of multimedia. [7]

II. Method

This research is a quasi experimental research with two group pretest - posttest design. The study population was all students of class X SMA PAB 8 Saentis consisting of 2 classes. Samples in this study were taken in total sampling, ie class X IPA 1 using learning practicum and Project Based Learning and class X IPA 2 as a control class using conventional teaching. This research instrument used the test of learning result with the form of multiple choice test as much as 27 item and questionnaire of interest of learning consist of 27 validated questions. The resulting data were analyzed using an anava 2 pathway with the help of SPSS.

III. Result and Discussion

3.1 Result

Based on the result of the research, the result of pretest and final test (postes) for both groups of experiment class and control class. After calculating so that the average pretest, posttest and standard deviation are in table 1 below:

Table 1 Average and Standard deviation

CLASS EXPERIMENT				CLASS CONTROL			
Pre test		Pos test		Pre test		Pos test	
X	S	X	S	X	S	X	S
37,375	16,25	84,125	7,997	38,286	16,63	73,714	8,77

Based on Table 1, the average pretest grade of experiment was 37,375 with the highest score of 70 and the lowest value 20 and standard deviation 16.25 while for the mean postes value was 84.125 with the highest score 100 and the lowest 65 and the standard deviation of 7.997. The average value of pretest control class was 38,286 with the highest score 70 and the lowest value 0 and standard deviation 16,63 whereas for average postes value equal to 73,714 with the highest value 90 and the lowest value 55 and standard deviation 8,77. Normality test of data is done by using chi squared test (χ^2). From result of calculation of pretest and postes data for experimental class obtained χ^2 count respectively that is 7,48 and 2,16 while χ^2 table 11,07. Based on the criteria $\chi^2_{count} < \chi^2_{table}$, then the pretest and posttest data of the experimental class was normally distributed.

Likewise, pretest and posttest data for the control class obtained χ^2_{counts} each of 5.62 and 7.43 while χ^2_{table} 11.07. Based on the criteria $\chi^2_{count} < \chi^2_{table}$, then the pretest and postes data of the control class was normally distributed.

Table 2 Test Result of Normality of Experiment Group Data

Class	Data	X /SD	χ^2_{counts}	χ^2_{table}	Description
Eksperimen	Pretes	$\bar{X} = 37,375$ SD = 16,25	7,48	11,07	Distributed data
	postes	$\bar{X} = 84,125$ SD = 7,997	2,16	11,07	Distributed data

Table 3 Test Result of Normality of Control Group Data

Class	Data	X /SD	χ^2_{counts}	χ^2_{table}	Description
Control	Pretes	$\bar{X} = 38,286$ SD = 16,63	5,62	11,07	Distributed data
	Postes	$\bar{X} = 73,714$ SD = 8,77	7,43	11,07	Distributed data

The homogeneity test of the data was conducted to find out whether each sample came from a homogeneous population by testing the students' pretest data with the two variance equality test. Testing criteria if $F_{count} < F_{table}$, then the data of both classes are homogeneous. Test results data are presented in Table 4.4 below.

Table 4 Data Homogeneity Test Results

Class	Data	Variance (S ²)	F _{count}	F _{tabel}	Description
Experiment	Results	S ² = 264,09	1,057	1,76	Homogeneous
Control	Learn	S ² = 276,39			

Based on the above table can be seen that $F_{count} < F_{table}$ (1.057 < 1.76) it can be concluded that the test results of learning both classes are homogeneous at a significant level ($\alpha = 0.05$).

Hypothesis testing is used with t test of two parties with the provision if - t table < t count < ttable, then alternative hypothesis (Ha) rejected and nil hypothesis (Ho) accepted. Hypothesis test result data as in table 5 below:

Table 5 Result Test of Hypothesis

Data	t _{count}	t _{tabel}	Keterangan
Learning outcomes	2,80	1,671	Ha accepted, Ho rejected

From the t distribution data obtained ttable = 1.671. Based on the hypothesis testing criteria, if - ttable < tcount < ttable, then Ho accepted, Ha rejected. But based on the calculation obtained t_{count} = 2.80 so that the price - ttable < tcount < ttable (-1,671 < 2.80 < 1.671) with a significant level of 5% ($\alpha = 0.05$). Thus the hypothesis testing criteria - ttable < tcount < ttable is not met. This means that Ho is rejected and Ha accepted, it can be stated that Ha which reads: " Students 'learning outcomes on learning practicum using project learning model learning on the material of atomic structure, systemic periodic and chemical bonds higher than the results of student learning using conventional teaching be accepted.

IV. CONCLUSION

The students' chemistry learning result using practical learning model and Project Based Learning was higher than using conventional teaching model. Result of analysis of research data reject H_0 and accepted H_a . This showed that the students' chemistry learning result that were taught using learning practicum and project based learning model was higher than the students' chemistry learning using conventional teaching learning model. At the time of the learning took place in the experimental class the researchers used practical learning and project based learning model. The purpose of the use of this learning was to increase cooperation among students, stimulate students to think critically and creatively, trigger students to be more thorough in working on the problem. After presenting the material in front of the class the researchers divided the students into groups. Then each group chooses the head of each group. Then the researchers divided the material for each group. Then the group divided and planned the tasks of each group member, followed by collecting as much information from both textbooks as well as from the internet. Then the students exchanged and discussed all the ideas they had gained. After all the information obtained students try with a practicum that has been prepared. The student then prepared the final report and the researcher guided the discussion until the discussion was over. After all groups have finished presenting and answering the questions posed by a group of audiences, the researcher then evaluated it by giving a test post for each student.

While in the control class, the researcher applied the conventional teaching learning model, began by giving the material to the students then followed by the steps applied to conventional lecture learning by explaining in detail the material that would be taught. Then the students asked questions to students who were searching or submitting information on the data about the problem. The teacher asked questions and gives posttest to the class.

The results obtained on learning practicum using project based learning model was higher than the class that used conventional lecture learning model was caused because in the classroom using learning practice using learning model project based learning students work systematically and plan and coordinate their own work, this was not the case in the control class using conventional lecture learning model.

In the hypothesis testing obtained $t_{count} > t_{table}$ is $2.80 > 1.671$ with a significant level of 5% ($\alpha = 0.05$) or 95% confidence level so that H_a is accepted which means Student learning outcomes on learning practicum using learning model project based learning on the material the practicum of atomic structure, periodic system and chemical bond is higher than the student's learning result using conventional lecture.

So based on research that has been done in SMA PAB 8 Saentis can be concluded that the application of practical learning and project based learning improve student's learning outcomes during the learning process.

V. Limitations of Research

Researchers have tried maximally in conducting research using practical learning and project based learning. But the implementation of the research is still experiencing some constraints that become shortcomings and limitations in the implementation of this research. The limitations in this study are:

1. This research is only limited to the implementation of learning using practical learning and project based learning
2. When students provide answers to test results chemistry may be less describes the actual conditions, because the lack of understanding of students of the instrument.
3. Limited facilities and schools, so the use of media and learning resources needed in the application of learning models have not been maximized.

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