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THE EFFECT OF USING THE PROJECT BASED LEARNING MODEL ON PROCESS SKILLS AND SCIENCE LITERATION SKILLS

(Quasi Study Experiments for Class V Students of SD Negeri 8 Metro Timur, SD Negeri 1 Metro Barat, SD Negeri 1 Metro Utara dan SD Negeri 5 Metro Pusat)

Ika W. Utamining Tias[1)], Srikandi Octaviani[1)]

[1)]*STKIP PGRI Metro, Lampung, Indonesia*
Corresponding Author: ikawulandari_ut@yahoo.com

Abstract. This research is motivated by the learning process carried out in class V of SD Negeri 8 Metro Timur, SD Negeri 1 Metro Barat, SD Negeri 1 Metro Utara dan SD Negeri 5 Metro Pusat. The implementation of the learning process carried out by teachers who generally still use conventional learning methods and models that are only fixated on books and more teacher-centered, students listen to explanations from the teacher, take notes, memorize information and work on problems. practice questions rather than doing practical activities through experiments or experiments. As a result, the learning process becomes less attractive and seems monotonous because students tend to be passive and less participatory in learning activities. Teachers lack innovation in the use of active and innovative methods or learning models that are more student centered. That is, learning that provides more opportunities for students to construct independently the process of understanding material through a more active learning process through search activities and problem solving. In response to this, researchers conduct learning using a project based learning learning model with the aim of improving students' science process skills and scientific literacy skills. The purpose of this study was to describe the influence of the PjBL model on process skills and scientific literacy skills. The type of this study is quasi-experimental research using the design of nonequivalent groups pre test-post test from Fraenkel and Wallen. The design of nonequivalent groups pre test - post test was started by setting the experimental group and the control group, then doing the pre test, followed by giving treatment to the two classes and ending with a post test. The subjects in this study were fifth grade elementary school students in Metro City. Data collection techniques in the form of tests. The research instrument is a spatial literacy test sheet. Data were analyzed using normality test and Mann Whitney test. The results of this study indicate that the PjBL model can improve science process skills and higher scientific literacy skills compared to groups of students who get conventional learning.

Keywords: skills of science literacy, skills of science process, elementary students.

I. INTRODUCTION

Natural science (science) as part of education in elementary schools can be seen as an initial stage in a formal effort to provide students with supplies. Furthermore, it was stated that the importance of science education in elementary schools will be the basis for the development of the next children, and some of them are the only formal education they will get during their lifetime. Science is not just memorizing the concepts and principles of science but rather, with science learning it is hoped that students can have attitudes and abilities that are useful for themselves in understanding the changes that occur in their environment and achievement in science lessons. Science of Nature Knowledge (IPA) deals with how to find out about nature systematically, so that science is not just mastery of knowledge collection in the form of facts, concepts, or principles but also is a process of discovery. Science education is expected to be a vehicle for students to learn about themselves and the environment, as well as the prospects for further development in applying in everyday life. The learning process emphasizes giving direct experience to develop competencies in order to explore and understand the natural environment naturally.

Basically science learning aims to prepare students to be responsive to their environment, because by learning science students can learn to understand natural phenomena that occur in their environment. According to the National Education Standards Agency (BNSP) explained, science subjects in elementary schools aim to have the following abilities: (1) Obtain confidence in the greatness of God Almighty based on the existence, beauty and regularity of His creation, (2) Develop knowledge and understanding of science concepts that are useful and applicable in everyday life; (3) developing curiosity, positive attitudes and awareness of the existence of interrelating relationships between science, environment, technology and society, (4) developing skills the process of investigating the surrounding environment, solving problems and making decisions, (5) increasing awareness to participate in and maintaining, maintaining and

preserving the natural environment, (6) increasing awareness to respect nature and all its order as one of God's creations, (7) gaining provision of science knowledge, concepts and skills as a basis for continuing p education.

The problem facing our world of education is the problem of the weak learning process. In the learning process students are not encouraged to develop critical and systematic thinking skills. The learning process is more directed at students' ability to memorize information. The brain of the student is forced to remember and hoard various information without being required to understand the information and not trying to relate it to everyday life. As a result, when our students graduate from school, they are theoretically clever, but lack an applicative level. Science learning encourages to emphasize the direct learning experience through the use and development of process skills and scientific attitudes when they are facilitated to construct their own knowledge, known as science learning using the scientific inquiry approach (scientific inquiry). Learning science as a subject in elementary school is more about giving knowledge, through observations, about various types and behaviors of the natural environment and the artificial environment; encourage students to be able to apply their knowledge to help the process of thinking or developing their mindset in solving science problems related to everyday life. But in reality many instructors still provide a way of teaching that is based on the old system, which is giving students material without encouraging students to find or solve their own problems. As a result, science is considered a memorization lesson, and the method of teaching is not good because the instructors do not have the motivation to teach, even they do not know how to teach science and they only have little knowledge about science. Science learning that is applied in schools also does not give the opportunity to students to actively carry out activities that can develop scientific literacy skills and lack of developing science process skills, only product oriented. In addition, learning is done in a classical and conventional manner, so that it does not develop student cooperation. Even though object observation can directly provide a different experience for students compared to just listening to the explanation.

All of these exposures were factors in students' low process skills and scientific literacy skills. Improving process skills and scientific literacy skills in learning activities is very important in order to create a society that is science literate and has character. Science literacy is one of the important issues that must be addressed in Indonesia.

The results of the PISA study on students' scientific literacy achievements in 2012 placed Indonesia in the rank 64 of 65 participating countries. These results indicate that students' scientific literacy achievements in Indonesia are still low. Based on the results of the PISA survey on scientific literacy achievements in 2012, it indicates that students in Indonesia have not been able to relate the lessons they have learned at school to the phenomena found in everyday life. The data shows that the goal of science learning in Indonesia has not been achieved.

From the observations of the implementation of science learning in one of the public elementary schools in the city of Metro, which shows that (1) the process of implementing general learning still uses conventional learning methods and models that are only fixated on books and teacher centered, (2) students listen to explanations from the teacher, record, memorize information and work on practice questions rather than doing practical activities through experiments or experiments, (3) The learning process becomes less interesting and seems monotonous because students tend to be passive and less participatory in learning activities , (4) Teachers lack innovation in the use of active and innovative methods or learning models that are more student centered.

Based on this description, there must be an effort to improve process skills and build students' scientific literacy. If it is not immediately addressed, it is feared that in the next few years Indonesia will not be able to compete with other countries in the fields of science and technology that can have an impact on the economy and development. To overcome this problem, the effort that can be done in order to help students is by applying the Project Based Learning (PjBL) model.

PjBL is a learning that focuses on concepts and facilitates students to investigate and determine a solution to the problem at hand. PjBL is learning that uses the project as a learning method. The students work in a real way, as if there is in the real world that can produce products realistically. Starting from these problems, the researchers are encouraged to conduct research with the title The Effect of Using the Project Based Learning Model on Process Skills and Student Literacy Skills.

Project Based Learning (PjBL) is one of the learning models that are suitable to be applied with the demands of education in this globalization era by integrating Science, Technology, Engineering and Mathematics (STEM) and building skills also forming characters in accordance with the demands of 21st century education. student-centered to build and apply concepts from projects produced by exploring and solving real-world problems independently (Afriana [1]).

PjBL is a learning model that uses problems as a first step in collecting and integrating new knowledge based on their experience in actual activities. The independence of students in learning and completing assignments is the goal of the PjBL, which must be trained by the teacher so students are familiar with the use of this learning model. Here the teacher is a

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facilitator, students work in groups and student-centered learning.

Project based learning is a student-centered learning model, ensuring the development of knowledge and skills in a particular field, through extensive work tasks that promote inquiry and authentic learning-oriented demonstrations. In PjBL students work independently, according to specified goals, and are encouraged to plan their actions, make their own decisions, and work together to get the desired results. Through the PjBL model students work in real terms, examine meaningful problems and create tangible products (Santrock [2]).

The model of project based learning makes students active, creative, and innovative in solving problems. Through the application of PjBL students will have the motivation to be able to complete tasks diligently because students are challenged in solving problems related to their daily lives. In addition, learning with the PjBL model is also related to the understanding and experience of students in actual activities.

The learning process by using the PjBL Model requires active participation from students from the beginning of learning to the end. This is related to the conditioning of students to build their own mindset in finding and overcoming a problem. The steps of the PjBL learning model can be seen as follows:

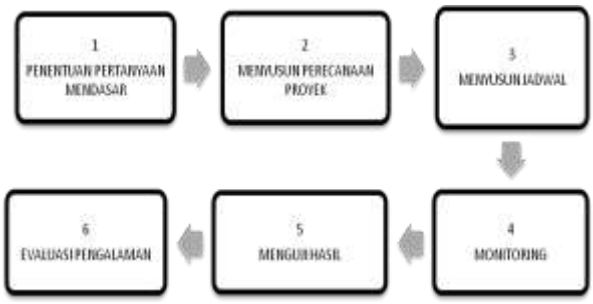

Figure 1 Steps of PjBL according to 2013 Curriculum

Satrianawati [3], explained the steps for implementing PjBL, namely as follows (2014: 501; Vol. 2 No. 1):

a) Determination of fundamental questions or better known as a driving question. This question determines the direction and goals that students must do to produce work or learning outcomes as learning products.
b) Prepare project planning or devise plan. Plans are designed to facilitate resolution or problem solving.
c) Arrange a schedule. The schedule is prepared with the consideration that everything that will be done must be determined when it is implemented so that all are on target.
d) Monitor or monitor carried out during the process of working on the project.
e) Test the results after the product or work has been completed by students.
f) Field evaluation is carried out in the field or applied in another place with the focus of the same problem so that the feasibility, unfairness or revision of the product has been obtained.

Based on the elaboration of these steps it is clearly illustrated how students are guided to learn independently to find concepts and solve problems, so that through learning using the PjBL model students can improve their process skills and scientific literacy skills.

II. RESEARCH METHODS

This experimental method is used to determine the application of the Project Based Learning (PjBL) learning model to improve process skills and scientific literacy skills. The predetermined subject group was given a pre-test, then managed the treatment conditions in one group, and gave post-tests. The design used in this study is Nonequivalent control Group Design. This design consists of two groups (2 elementary experimental groups and 2 elementary control groups) who were randomly selected and then given a pre-test to find out the initial condition is there a difference between the experimental group and the control group. The research design framework (Sugiyono [4]), as follows:

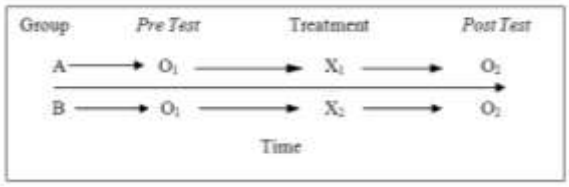

Figure 2. Nonequivalent Groups PreTest-Post-Test Design

Information:

A : Experimental class
B : Control Class
X_1 : Treatment (treatment) utilizes map media
X_2 : Treatment (treatment) does not use map media
O_1 : Initial test before treatment
O_2 : Final test after treatment

This study aims to determine the effect of Project Based Learning learning models on process skills and scientific literacy skills of fifth grade students of elementary school. Schools that will be used as research locations are schools in the Metro city environment, namely: SD Negeri 8 Metro Timur, SD Negeri 1 Metro Barat, SD Negeri 1 Metro Utara dan SD Negeri 5 Metro Pusat

III. RESULTS AND DISCUSSION

Enhancing Science Process Skills

The figure below shows the average percentage of pretest and posttest scores in science process skills of the experimental class and the control class. Based on Figure 5.2, the average pretest score for the experimental class is 4.72 and the control class is 2.74. The average posttest of students' science process skills in the experimental class is 9.36 and the control class is 7.56.

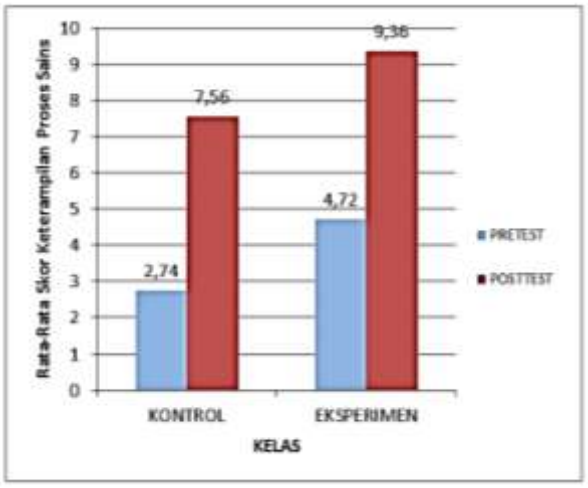

Figure 3. the average percentage of pretest and posttest scores in science process skills of the experimental class and the control class

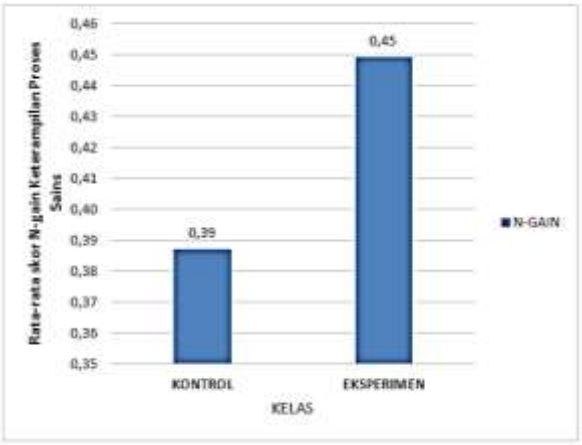

Figure 4. The normalized gain value for the experimental class and the control class

Based on the average score of the pretest and posttest of the experimental class and the control class, the normalized gain for each class can be calculated as shown above. In terms of numbers, it appears that the normalized gain values for the experimental class are greater than the control class. The normalized gain value for the experimental class is 0.45 with the moderate category and the control class 0.39 with the moderate category.

Enhancing Science Literacy Capabilities

The figure below shows the average percentage of pretest and posttest scores in scientific literacy skills of the experimental class and the control class. Based on Figure 5. the average pretest score for the experimental class is 6.46 and the control class is 7.42. The average posttest of scientific literacy skills in the experimental class 13.28 and the control class is 10.76

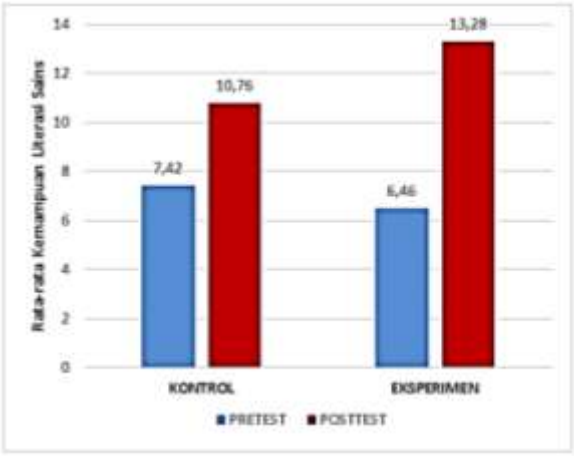

Figure 5. the average percentage of pretest and posttest scores in scientific literacy skills of the experimental class and the control class

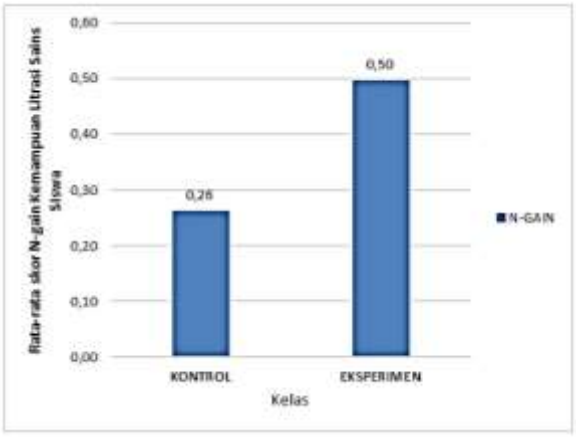

Figure 4. The normalized gain value for the experimental class and the control class

Based on the average score of the pretest and posttest of the experimental class and the control class, the normalized gain for each class can be calculated as shown above. In terms of numbers, it appears that the normalized gain values for the experimental class are greater than the control class. The normalized gain value for the experimental class is 0.50 with the moderate category and the control class 0.26 with the low category.

Effectiveness Test of the Effect of the Project Based Learning Model to Improve

Science Process Skills and Science Literacy Capabilities. Based on the results of research on several schools, the following results are obtained.

1) Tests of Normality

Table 1. Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	metode	Statistic	df	Sig.	Statistic	Df	Sig.
nilai	1.00	.150	50	.007	.957	50	.067
	2.00	.131	50	.031	.951	50	.037

a. Lilliefors Significance Correction

Based on the Liliefors and Shapiro Wilk methods, Sig (p value) values of 0.067 and 0.037 were obtained. When compared with the value of the error level of 0.05, there is one data that is less than 0.05, the value of the experimental method used. This shows that the data analyzed is not normally distributed.

Test of Homogeneity of Variance

Table 2. Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
value	Based on Mean	.020	1	98	.887
	Based on Median	.095	1	98	.759
	Based on Median and with adjusted df	.095	1	87.062	.759
	Based on trimmed mean	.037	1	98	.848

The table above results from the analysis of homogeneity test data using Leven's test. Why? Because the Levene test is more recommended to test the variance homogeneity of data that is not normally distributed. What is seen? The acquisition based on mean (green) is sig (p value) 0.887> 0.05, which means the variance of the two groups is equal or homogeneous.

2. Test the hypothesis

Table 3. Rank Test the hypothesis

	method	N	Mean Rank	Sum of Ranks
value	1.00	50	35.49	1774.50
	2.00	50	65.51	3275.50
	Total	100		

The table above shows the mean rank or average ranking of each group. That is in group 1 the average rating is 35.49 lower than the average second rank 65.51. so that to find out has a significant influence then look at the following table.

Table 4. Test Statistics[a]

	nilai
Mann-Whitney U	499.500
Wilcoxon W	1774.500
Z	-5.225
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: metode

The table above shows a U value of 499.50 and a W value of 1774.50. If converted to the value of Z then the magnitude is -5,225. Sig or P Value is 0.00 <0.05. If the Sig value is <critical value 0.05 then it means that there are significant / significant differences /differences between the two groups of values which means H1 is accepted.

Conclusion of the effective test, there is a significant/significant median difference between 2 groups/classes, and the results of the hypothesis test are the effect/difference is significant so that H1 is accepted.

According to Jagantara (2014), the Project based learning (PjBL) learning model has been able to provide better results compared to direct learning. The learning model (PjBL) which involves the active role of students is essentially aimed at (1) increasing motivation, (2) high-level thinking skills, (3) understanding the material as a whole, and (4) improving student process skills. If implemented correctly, the achievement of students in the four components is very likely to occur. PjBL learning model requires the activities of students in carrying out various skills, namely: (1) managing projects, (2) managing time, (3) organizing, (4) working in groups, (5) conducting research, (6) looking for materials, and (7) solving real world problems. In these activities, the five senses of students are actively involved. This greatly supports the mastery of concepts more easily and long-lasting in the memory of students.

The Project Based Learning learning model if done with good preparation will bring results that are in accordance with the learning objectives to be achieved. According to Turgut [5] PjBL learning can give a strong emphasis on problem solving as a collaborative effort carried out in the learning process at a certain period and use a study plan that is strictly adhered to, students are delegated to achieve certain goals and learning outcomes. Project-based learning provides opportunities for students to study certain topics in depth. Students can learn independently about what they learn, maintain their interest and motivation to be responsible for their learning.

PjBL learning model in the learning process because this method has several advantages including being able to increase the enthusiasm of students because it is always active, helping to create a conducive learning atmosphere because learning relies on real world problems and raises excitement in the learning process. This is because the learning process runs dynamically and openly from various directions.

IV. CONCLUSION

Based on the results of the research and discussion presented earlier, the learning of Project Based Learning (PjBL) in improving science process skills and scientific literacy skills is concluded as follows; Improving science process skills is a group of students who get learning PjBL higher than the group of students who get conventional learning; Increased scientific literacy skills of groups of students who received PjBL learning were higher compared to groups of students who received conventional learning.

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