Project Base Learning with Science Club on Car Free Day to Improve Science Literacy of Fourth Semester Elementary School Teacher Education Students in the Academic Year of 2018/2019

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Abstract. This research is aims to findings that science learning in Elementary School Teacher Education (PGSD) students for lack of involvement and motivation of students in learning process so that it affects students' scientific literacy skills. Furthermore, to overcome these problems learning is done by using the Project Base Learning model with the Science Club on Car Free Day. This study aims to analyze the effect of the project based on learning model in student literacy skills by science learning courses. This research used quasi experiment method with the research design Nonequivalent Control Group Design. The sampling in this study was the fourth semester student of PGSD Muhammadiyah University Purworejo. The sampling technique is done by cluster random sampling technique. The results show in the scientific literacy abilities of students using the project base learning model produced an average score of 52.97 pretest, 79.03 posttest and 56% N-Gain. While, the class that uses the method as usual produces an average value of 62.91 pretest, posttest 75.39 and N-Gain 27%. Based on the results of the main analysis of N-Gain, Z count (5.63) ≥ Z table (1.65) with α of 0.05 (5%), then H_0 is rejected and H_a is accepted. This shows that the project base learning model has a significant effect on students' scientific literacy abilities.

Keyword: analysis, motivation, learning process

1 Introduction

Natural Sciences (IPA) also referred to as science. As a science, science has unique characteristics and characteristics that distinguish it from other sciences. Science is knowledge whose truth has been empirically tested through scientific methods. Science consists of chemistry, physics and biology [1]. Science learning process that focuses on a process of research or experimentation, it is expected that in the learning process can improve the thinking process of students to understand natural phenomena. In addition, it is also expected to arouse interest, Science also provides ability to develop the science and technology as well as an understanding of the universe that has many facts that have not been revealed and are still confidential, so that the findings are developed into new natural sciences and can be applied in daily life [2]. Science based to form scientific insights, skills and attitudes early on for students. These three aspects can be obtained by providing direct experience through a series of scientific processes which include observing to draw conclusions. According to[3], a science teacher must have several characteristics, including enthusiasm in teaching, high self-

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confidence, creativity, responsibility, good sense of humour and communication skills. In addition, in teaching science also needed something that can be attracted by students' interests including by using media and teaching aids. This is process more effective and efficient. Thus a Science teacher must also have skills in making teaching aids.

According to[4] science learning prepares learners to (1) be able to solve problems encountered in daily life by using the scientific concepts they have learned, (2) able to make appropriated decisions using concepts scientific concepts, (3) able to anticipated the negative impacts of science and technology, and (4) able to anticipated thinking into the future. One effort to support increased mastery of science concepts and to develop scientific and technological literacy is that science learning should always be linked and matched (link and match) with social issues in the student environment, as well as contextual with students' initial knowledge .Project-based learning is an innovative learning model or approach, which emphasizes contextual learning through complex activities[5]. The focus of this study lies in the concepts and core principles of a study discipline, involving learners in problem solving investigations and other meaningful task activities, giving learners the opportunity to work autonomously to construct their own knowledge, and reached the peak in producing tangible products . The project focused on product development or performance, which in general learners carry out activities: organizing their group learning activities, conducting studies or research, solving problems, and synthesizing information.There are two types that develop in students during project-based learning, namely knowledge and technology. Through project-based learning students will learn science and technology related to the application of the knowledge they learn. Through this learning students will be challenged to solve problems comprehensively through the planned project. Furthermore, through this learning students are expected to increase self-confidence, have self-pride, have a strong motivation to learn, and greater responsibility. In addition, through project-based learning students will learn to build social skills and try to play a role as a good part of society.Science literacy is defines that the capacity to applied knowledge and skills and to analyze, reason and communicate effectively when they are faced with problems, must solve and interpret problems in various situations. In PISA science literacy covers the dimensions of content, process and context. Science material or content is not directly related to the curriculum in any country. The scientific process in PISA includes the use of scientific knowledge, making decisions, in the context of the world context, covering the context involves issues that are important in life in general as well as for personal care.

Many students have the different abilities / competencies, it is necessary to increase the ability of scientific literacy to increase knowledge related to science and its application in everyday life. The results of the PISA assessment conducted since 2000 did not show brilliant results because the average score was still far below the international average which reached a score of 500. In this case, the average science score obtained by Indonesian students was 371 in 2000, 382 in 2003, and 393 in 2006. The results of the TIMSS assessment of Indonesian students' scientific achievements in 1999 ranked 32 out of 38 countries with a score of 435, in 2003 ranked 37 out of 46 countries, and in 2007 ranked 35 out of 49 countries[6].

Based on the above, it is necessary to apply a project-based learning model with a science club on car free day to increase student scientific literacy. The Science Club at Car Free Day is a place for students to present or exhibit projects that have been created so that they directly interact with the general public. Creativity in choosing the right learning model will help students understand the material being taught. The learning model is a plan or pattern that can be used to shape the curriculum (long-term learning plan), design learning materials, and

guide learning in the classroom. Learning models need to be understood in order to carry out learning effectively in improving learning outcomes[7].

2 Method

This research based on quasi experimental design method. The design used in this study is Nonequivalent Control Group Design. As for the samples in this study were 4B (experimental class) and 4A (control class) classes taken by cluster random sampling. The instruments used were RPS, Observation Sheet for students and lecturers and tests of scientific literacy skills. The resulting project will be presented or exhibited by the science club vehicle on Car Free Day every Sunday morning.

3 Results and Discussion

1. Observation Sheet The implementation of the learning process using a project-based learning model is observed through the observation sheet. This observation sheet consists of an observation sheet on the lecturer and student activities. The learning process is carried out during 3 meetings in class 4A. This observation sheet is filled in by the observer during the learning process.
   a) Lecturer Activity Observation Sheet
      The recapitulation of the results of the lecturer activity observation sheet is generally listed in table 1.

Table 1. Recapitulation observation sheet for lecturer meeting activities to observation score%

Meeting to-	Observation score		%	Category
1	2	3	92 %	very good
2	2	5	100 %	very good
3	2	5	100 %	very good
Average	7	3	97,33%	very good

b) Student Activity Observation Sheet
   Recapitulation of the results of observations of student activity in general is listed in table 2.

Table 2. Recapitulation of student activity observation sheets

Meeting to-	Observation score		%	Category
1	1	6	94 %	Very Good
2	1	7	100 %	Very Good
3	1	7	100 %	Very Good
Average	5	0	98 %	Very Good

Based on tables 1 and 2 show learning activities in the experimental class with a very good category. The results show that the learning process using the project-based learning model is implemented very well and contributes to students' scientific literacy skills.

Results of Student's Literacy Capabilities

To see differences in the results of the average value of scientific literacy skills in the classroom using project-based learning models and using lecture and discussion methods can be seen in Figure 1

Based on Figure 1 shows differences in the average value of students who have an impact on improving the average ability of scientific literacy in the classroom using project-based learning models and using lecture and discussion methods. In the class using the project-based learning model an increase in the medium category, while in the class using the lecture and discussion method an increase in the low category.

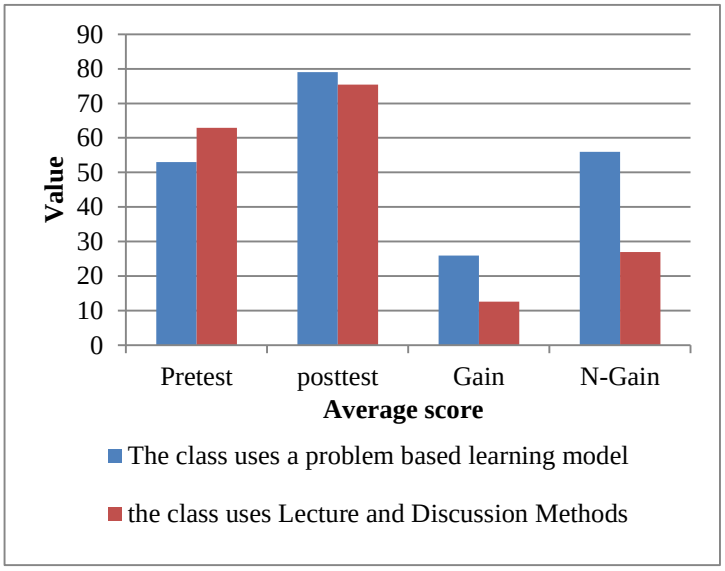

Fig. 1. Graph summary of pretest value, posttest value, gain, and n-gain of students in classroom using project-based learning models and classes using lectureanddiscussion methods

To find out the influence of project-based learning models on the ability of scientific literacy, a hypothesis test was carried out on the posttest value and the N-gain value. Before conducting the hypothesis test, the posttest value and the N-gain value are tested for normality and homogeneity first. This is done to find out which type of hypothesis test will be used.

Table 3. Data hypothesis test resultsposttest and n-gain

Data	**Postest**		**N-Gain**	
hypothesis testing	t [1]	n K [1]	Z_{hitung}	Z_{tabel}
Results	2,23	2,23	5,63	1,65
Conclusion	H_0 rejected dan H_a be accepted		H_0 rejected dan H_a be accepted	

Based on the statistical analysis of posttest data and N-Gain listed in table 4.18 shows that $t' \geq nKt'$ and $Zhitung \geq Ztabel$, then H_0 is rejected and H_a is accepted. This means that with a significance level (α) = 5%, there is a difference in the increase in the ability of scientific literacy in the classroom using project-based learning models and using lecture and discussion methods. In other words, there is an influence of project-based learning models on students' scientific literacy abilities. Project-based learning models make students experience a series of processes that support the achievement of indicators of scientific literacy skills. The learning process lasts for 3 meetings with 5 stages of the project based learning model.

In general, the five main steps in implementing project-based learning are:

(1) Establish the project theme, where each group will discuss the theme that will be made into a project in the form of teaching aids or science experiments, namely material for Elementary School Science 4-6; (2). Determine the learning context, namely activities related to a predetermined theme, the project to be produced is immediately determined in relation to its shape, model, material and also the final product produced; (3) Planning activities, these activities are in the form of division of tasks between group members related to the project to be produced, so that responsibilities and cooperation will be formed; (4) Process activities ie steps taken must be in accordance with existing procedures so the best results will be obtained; (5). The application of activities to complete the project, after the project is completed, the project results will be assessed in the form of a science club on car free day.

Based on the description above, the stages of project-based learning support the achievement of indicators of scientific literacy, especially aspects of competence and attitude aspects. This statement is supported by research conducted by[8]which states that project-based learning has an effect on improving students' scientific attitudes by acquiring in the experimental class by 83.85% including the very high category, while in the control class by 56.85 % includes enough categories. During learning, students can feel the benefits of learning because the problem being solved is directly linked to real life. This can increase students' motivation and interest in the material being studied (AlTabany, 2014: 68).

This is reinforced by research conducted by[9] which shows the average value of students' scientific literacy skills obtained by the experimental class (48.47) with the application of the project-based learning model higher than the value of the control class (26,95) which uses conventional learning models. Some of the advantages raised by Al-Tabany (2014: 68) such as students better understanding the concepts taught and involving students actively solving problems and demanding higher student thinking skills seen during the learning process.

In line with research conducted by[10] which states that the project-based learning model is effective against students' scientific literacy abilities with an average scientific literacy ability of 79.32% in the experimental class and 70.34% in control class. That is because students discover the concept for themselves. In accordance with Bruner's statement in Al-Tabany (2014: 63) that trying alone to find solutions to problems and the accompanying knowledge, produce knowledge that is truly meaningful. A logical consequence, because trying to find solutions to problems independently will provide a concrete experience. The experience can also be used to solve similar problems, because the experience provides its own meaning for students.

Characteristics of scientific literacy has four interrelated aspects, namely: (a) context: recognising life situations involving science and technology; (b) knowledge: understanding the natural world on the basis of scientific knowledge that includes both knowledge of the natural world, and knowledge about science itself; (c) competencies: scientific demonstrating competencies that include identifying scientific issues, explaining phenomena scientifically, and improving Scientific Literacy 2 using scientific evidence; (d) attitudes: Indicating an

interest in science, support for scientific inquiry, and motivation to act responsibly towards, for example, natural resources and environments[11].

The ability of students to use knowledge and understanding of science as a basis for making decisions in life can not be separated from the learning process in the classroom. The learning process that supports science literacy accommodated in the learning model used. Learning science on 2013 national curriculum has provided guidance in the selection of appropriate learning model with a scientific approach. Learning model may include: projectbased learning (PjBL), problem-based learning (PBL), or discovery learning. Selection of learning models submitted to the teacher to adapt to the characteristics of teaching materials. Project-based learning is a model student-centered learning and provide meaningful learning experiences for students. Student learning experience and builds upon the concept of products produced in the process of project-based learning.

Project-based learning is a learning model that uses matter as a first step in collecting and integrating new knowledge based on experience in the activity significantly. Through the PjBL, the process begins with the inquiry raises questions guide (a guiding question) and guiding students in a collaborative project that integrates a wide range of subject in the curriculum. PjBL is an in-depth investigation of a topic that is valuable to the real world attention and effort students[12].

[13]states that: project based learning focuses on creating a product or an artifact by using problem-based and inquiry-based learning Depending on the depth of the driving question. There is a link between problem-based learning (PBL) and inquiry-based learning (IBL) in PjBL. PBL focuses on real-world problem solving, and inquiry learning focuses on problem-solving skills, while the PjBL focused on creating a product or project in the build concept.

Project-based learning model According to[14] explains that project-based learning is a learning strategy that empowers students to gain new knowledge and understanding based on their experiences through various presentations. The characteristics of project-based learning are students investigating important ideas and asking questions, students find understanding in the process of investigating, according to their needs and interests, produce products and think creatively, critically and skillfully investigate, infer material, and connect with real-world, authentic problems and issues.

Implementation of project-based learning in learning the science of research results can improve the cognitive learning, forming attitudes and behavior care about the environment[15][16], science process skills[17], and effective learning[18][19]Project-based learning is more appropriate in interdisciplinary learning because it naturally involves many different academic skills, such as reading, writing, and mathematics and fit in building conceptual understanding through the assimilation of different subjects[20]

4 Conslusion

Based on the results of research on the effect of project-based learning models on the ability of scientific literacy that have been implemented can be summarized as follows:

1. The process of implementing project-based learning is done very well with an average percentage of 97.33% for the implementation of lecturer activities, and 98% for the implementation of student activities, as well as making a positive contribution to the ability of student scientific literacy.

2. The results of students' scientific literacy skills in learning by using project-based learning models are in the moderate category (0.56) with an average pretest score of 52.97 and the average value of the posttest score is 79.03 with a good category. The results of students' scientific literacy skills in learning with the lecture and discussion methods are in the low category (0.27) with an average pretest score of 62.91 in the sufficient category and an average posttest score of 75.39 in the good category.
3. There is an influence of project-based learning models on the ability of scientific literacy with a significance level of 5%.

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