The difference of students learning outcomes using the project-based learning and problem-based learning model in terms of self-efficacy

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Abstract. The results of the preliminary survey indicate that there are still many students who have not been able to solve the problem, the learning is still teacher-centered. For this reason, problem based and project based learning is implemented. The research aims to determine the differences of the student learning outcomes using Project Based Learning (PjBL) and Problem Based Learning (PBL) models in terms of self efficacy. The design of the research was quasi-experiment with 2x2 factorial design. The population is fifth-grade students of Elementary School (SD Kartika 1-11) in Padang, Indonesia. Sampling was done by cluster random sampling technique. The research instrument was a learning outcome test and questionnaire. Data were analyzed using two-way ANOVA. The results showed that: (1) the learning outcomes of students using the PjBL model were higher than the PBL model, (2) the learning outcomes of students who had high self-efficacy were better than low self-efficacy, (3) there is no interaction between learning models with self-efficacy on student learning outcomes.

1. Introduction
Indonesian education continues growing in all elements such as curriculum. The curriculum as the main guideline for education has changed periodically on its perfection, for instance, the development of the 2013 curriculum. This curriculum uses a thematic approach for its planning and scientific approach for its implementation. This matter is arranged by the regulation of the Ministry of Education and Culture (Permendikbud) Number 81A the year 2013 concerning the implementation of the curriculum.

The implementation of the 2013 curriculum in Elementary Schools has always undergone a change towards perfection. Finally, it was regulated by the Minister of Education and Culture of 2016 number 20 concerning the Standard of Graduates Competence, number 21 on Content Standard, number 22 on Process Standards, number 23 on Assessment Standard, number 24 on Core Competencies and Basic Competencies. The Act of Ministry of Education and Culture number 22 the year 2016 mandated that the implementation of learning in elementary schools is strengthened by the application of Project-based Learning (PjBL) learning models, Problem-based Learning (PBL), and Discovery / Inquiry Learning [1].

PBL has characteristics in which learning is done by raising problems to the students. This is in line with the understanding of PBL as a learning model that uses problems as a basis in developing new knowledge of the students [2]. The main purposes of the PBL model are the development of critical thinking skills, problem-solving abilities, as well as the ability of students to actively build their own knowledge [3]. In achieving these goals, the learning process starts from studying the problem, learning based on complex real-world situations, the students work in groups, the information needed
to solve problems were not provided, learners identify, find and use appropriate resources, learn actively, integrated and interconnected [4]. With the PBL model, the student competencies can improve in several ways, such as transferring concepts to new problems, integrating concepts, increasing learning interest, learning with their own direction, and increasing learning skills [5].

PjBL is a learning model that produces a product. PjBL is a learning model that has long-term activities by involving the students in designing, creating, and displaying products to overcome real-world problems so that the students can develop the ability to plan, communicate, solve problems, and make decisions [6]. The learning goal introduced from project-based learning is that the students are able to design and create a work with high creativity [4]. Therefore, learning activities are adjusted to the characteristics of the PjBL, which focuses on important concepts, learner-centered learning, realistic project, constructive investigation, and produce products [6]. In the end, it can be concluded that PjBL can develop students' scientific attitudes.

Based on the preliminary study in Elementary School Kartika 1-11 Padang obtained the students’ learning outcomes on Theme 4, Subtheme 1. It was found that the average learning outcome of the students was 64.3. Most of the students (71.5%) who have not mastered learning. Students have difficulty in connecting the knowledge they already have with new knowledge. Most students have not been able to solve problems. The teacher has not applied a variety of learning methods. One of solving this problem was applied PjBL and PBL model.

The relevant research showed that the PBL and PjBL models have a role in learning for elementary school students. The difference in the average students’ learning outcomes of the experimental group tends to be higher than the control group students [7]. These different of learning outcomes show that the implementation of the project-based learning model has a more positive effect on student learning outcomes compared to conventional learning models. The students’ learning outcomes using PBL learning models assisted by visual media animation better than conventional learning [8]. This result illustrates the role of PBL in student learning outcomes.

The learning outcomes are the main things in learning. Either in the form of results that can be measured directly with test or non-test. Learning outcomes can be seen in its application in daily life. It consists of understanding concepts (knowledge), process skills, and student attitudes [9]. Good learning outcomes can be influenced by the learning model used by the teacher. The formulation of the research problem is how is the difference of students learning outcomes using the project-based learning and problem-based learning model in terms of self-efficacy?

2. Method
This research was designed using a quasi-experiment with a 2x2 factorial design. The population was grade 5th of Elementary School students (SD Kartika 1-11) in Padang, Indonesia. The sampling technique was done by cluster random, with samples of 5E class as the first experimental class and 5B as the second experimental class. The research data were collected through the questionnaire and test. The self-efficacy questionnaire consists of 3 dimensions, namely magnitude, strength, and generality [10]. Data analysis techniques use two way ANOVA. The teaching material discussed in this research was Health is Important (Theme 4) My blood circulation is healthy (Sub-theme 1).

3. Results and Discussion
The results of this research described the students learning outcomes using project-based learning and problem-based learning model. The difference of students learning outcomes using the project-based learning and problem-based learning model in terms of self-efficacy was obtained from the results of two-way analysis of variant.

The students learning outcomes
The data on learning outcomes in this research was obtained through the pre-test and post-test of each experimental class. In Table 1 can see the pre-test average and the post-test average of students’ learning outcomes of the PjBL class and PBL class. The pre-test average of PjBL class was 41.01 and the post-test average was 84.81. Meanwhile, the average students’ learning outcomes in PBL class was 33.94 for pre-test and 76.10 for post-test. The maximum and minimum of students’ learning outcomes
in the PjBL class were 100 and 73.33. The maximum and minimum of students’ learning outcomes in the PBL class were 94.17 and 61.67.

| Self Efficacy | PjBL Class | PBL Class |
|---------------|------------|-----------|
|               | Pre-test Average | Post-test Average | Pre-test Average | Post-test Average |
| High          | 41.66     | 88.71     | 37.33     | 81.67     |
| Low           | 40.37     | 80.91     | 30.55     | 70.53     |

Table 1. The students learning outcomes

The difference of students learning outcomes based on the learning model and self-efficacy

The requirements analysis test was conducted to see conclusions about the data obtained from the test of the learning outcomes of students in both classes. Before the hypothesis test, conducting the normality test of data distribution and the homogeneity test of data. The normality distribution test of data distribution showed that the learning outcome of students in both class before learning was normally distributed. Similar results for students' learning outcome after learning. The homogeneity test of students' learning outcome before learning showed that the learning outcome of students in both class was homogeneous, as well as the students learning outcome after learning. After the average difference test on the students learning outcome before the learning obtained the result that the average of the students' learning outcome of both class did not differ significantly (p = 0.23). Testing the hypothesis in this research using two-way ANOVA. The results of hypothesis testing can be seen in Table 2.

| Source of Variation | SS    | df  | MS    | F-value | F-crit |
|---------------------|-------|-----|-------|---------|--------|
| Learning model      | 1353.978 | 10  | 135.398 | 7.000   | 2.297  |
| Learning creativity | 834.592  | 1   | 834.592 | 43.149  | 4.301  |
| Interaction         | 258.580  | 10  | 25.858  | 1.337   | 2.297  |
| Within              | 425.522  | 22  | 19.342  |         |        |

Table 2. The result of two way ANOVA

Based on the results of the two way ANOVA, it can be concluded that the results of the first null hypothesis test were rejected, meaning that there was difference in student learning outcome that conducted project-based learning with problem-based learning. Student learning outcome that conducted project-based learning was better than the learning outcome of students who conducted problem-based learning. The results of the second null hypothesis test were rejected, meaning that there was the difference in learning outcome of the student who have high self-efficacy with learning outcome of the student who has low self-efficacy in project-based learning. The learning outcome of the student who has high self-efficacy was better than the student who has low self-efficacy. The results of the third null hypothesis test are accepted, meaning that there was no the interaction between the learning model and students' self-efficacy in influencing student learning outcomes. This shows that the learning model and self-efficacy affect student learning outcomes. Students who have high self-efficacy were easier to implement project-based learning than students who have low self-efficacy. The interaction between learning models and student self-efficacy can be seen in figure 1.
Discussion

Based on the results of the research, it can be seen that the students’ learning outcomes of the experimental class using the project-based learning model were higher than the experimental class students who studied using the problem-based learning model. The average of the students’ learning outcomes using the PjBL model higher than conventional model [11]. This research has stated that the project-based learning model was more influential than the PBL model. PjBL model learning steps can improve students’ skills and problem-solving, students become motivated in learning, collaborate for solving problems so that learning atmospheres become fun.

Therefore, it was in line with the result of this study. During the learning process in the experimental class I using the project-based learning model, the students had an attitude that strongly responded to what the teacher said because learning began with enjoyable activities. The students did learning activities very well. All the students looked enthusiastic and active in learning because every student had to be engaged in learning activities and work together. No one was passive. The students were active and worked together in solving complex problems that result in more permanent and logical knowledge acquisition of subject matter and obviously impact directly on improving student learning outcomes.

However, the students who were using the project-based learning model were more interested in learning through learning in their own direction to improve learning skills. Problems became the center of learning activities. The learning process started from studying the problem and based on complex real-world situations. They worked in groups but some information needed to solve problems is not given. Then, they identified, find, and use appropriate resources, learn actively, integrated, and interconnected. They also learned to explore knowledge through the process of repeated questions, active learning, sharing, and reflection using the problems. At the time of the implementation of learning, some students were responsive to the questions raised by the teacher and student learning outcomes also increased. On the contrary, the increase that occurred was still less than the class that used the project-based learning model. This result was on the fact that problem-based learning pattern was learning by direction.

The project-based learning model can create a learning atmosphere to be fun and develop problem-solving skills [4]. The application of the project-based learning model in learning had several advantages, such as create experience in managing projects, time allocation, and resources to complete tasks, make students more active and successfully solving complex problems, including students to learn to gather information, process and implement the knowledge into the real world [12]. These elements will acquire permanent and logical knowledge.

Student learning outcomes using the PjBL model with PBL in low self-efficacy obtained moderate categories, while in high self-efficacy high categories were obtained. The students who have high self-efficacy will usually strive to master their learning assignments [13]. Therefore someone with the
same level of intelligence makes it possible to get different results because of the effects of Self Efficacy.

During the learning process using the project-based learning model, students had an attitude that strongly responded to what the teacher said because learning began with a fun, it was seen students doing learning activities well. All students looked enthusiastic and active in learning because this is because every student in his learning group is required to work together, no student does not work in his group, students are active and work together in solving complex problems that result in more permanent and logical knowledge acquisition of subject matter and of course impact directly on improving student learning outcomes [14].

The characteristics of the PBL model arise when presenting problems in learning, students learn to explore knowledge through the process of repeated questions, active learning, sharing, and reflection [15]. At the time of the implementation of learning some students were responsive to the questions raised by the teacher and student learning outcomes also increased, but the increase that occurred was still less than the class using the project-based learning model. This is because the problem-based learning pattern is learning by direction. In contrast to students using the project-based learning model, students who use the problem-based learning model in the class problem-based learning were more interested in learning through learning by their own direction so as to improve learning skills [16]. This is because problems become the focus of learning. The project-based learning model can create a learning atmosphere to be fun, and develop problem-solving skills [17]. The learning process starts from studying the problem, learning is based on complex real-world situations, students work in groups, some information needed to solve problems is not given, students identify, find and use appropriate resources, learn actively, integrated, and interconnected.

Based on the description of the research findings and data analysis, it was concluded that there were differences in students’ learning outcomes using the project-based learning model compared to the problem-based learning model. In addition, the results of the research had also strengthened by previous studies on the effect of using project-based learning and learning motivation on learning outcomes of fifth grade in Elementary School students [4]. This research showed that there was a significant influence on the use of the project-based learning model on the learning outcomes of fifth grade in Elementary School students.

4. Conclusion
It was concluded based on the results of the research findings: (1) the learning outcomes of students using the project-based learning model were higher than the problem-based learning model, (2) the learning outcomes of students who had high self-efficacy were better than low self-efficacy, (3) there is no interaction between learning models with self-efficacy on student learning outcomes.

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