



Project-Based Learning to Enhance Creativity and Learning Outcomes

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Abstract. Project-based learning is a type of education that gives students the chance to expand their knowledge. This learning can also develop learners' abilities to solve problems through real-world activities and tasks in a project. In this article, the research was conducted due to the lack of creativity among students in learning about electric lighting installations. The completeness of the learning outcomes of the electric lighting installation from the 30 students who completed it was only 40%. Project-based learning is one of the learning strategies that might boost student creativity. In project-based learning, learners are encouraged to be more engaged in learning. The teacher only acts as a facilitator. Teachers evaluate the products of student work that are displayed in the project results. Based on this fact, research was carried out on the influence of project-based learning on the subject of electric lighting installations. The purpose of this study is to improve the creativity and learning outcomes of students by applying project-based learning to the learning of electric lighting installations. This type of research is quasi-experimental with a pretest-posttest design. The subjects of this study consisted of 30 learners. Data collection in this study used pre-test and post-test learning outcome tests. The results showed that learning outcomes using project-based learning had an average score of 84,433. The results have met 100% completion. Thus, it can be concluded that project-based learning can improve learning outcomes. Related to psychomotor learning, project-based learning can develop the creativity of learners in planning and completing a project.

Keywords: Project-based Learning · Creativity · Learning Outcomes

1 Introduction

Project-based learning (PjBL) is a learning technique that allows teachers to control classroom learning by including project work. Project work encourages students to develop, solve issues, make decisions, do research, and give opportunity for students to work individually or in groups. It also includes sophisticated problem-solving challenges as the initial stage in accumulating and integrating new information based on their experience in real-world activities [1]. Project-based learning strives to promote student engagement in the educational process by utilizing collaborative small-group projects.

It is also known through observations that pupils who learn using traditional methods typically used in schools for Instalasi Penerangan Listrik (IPL) receive more information from teachers than those who learn independently or in groups. Students are less interested in solving problems that require critical and creative thinking [2]. Such learning methods and styles have a negative impact on student learning outcomes. The PjBL model is used to train students in solving problems so that students can learn information pertaining to the problem and at the same time have the abilities to solve problems, through the steps of the scientific method, both critical thinking problems and the interaction between teachers and students that optimally has an impact on increasing mastery of student concepts that can increase student learning achievement [3].

Vocational High School is an educational institution that is anticipated to be able to generate graduates of high quality who meet national and international criteria for abilities, experience, attitudes, and values. This is in accordance with the vision of national education in UU No. 20/2003 on National Education System, where one of the missions carried out is to raise the professionalism and responsibility of educational institutions as centers for developing knowledge according to national and international standards [4].

The quality of education is influenced by several things, including: infrastructure, educational environment, education management, funds, and educators. Students are the main center during the learning process, where they are required to be active in solving a problem related to the learning material. Furthermore, teachers are supporters and directors of their students' learning, as well as creators of active and innovative learning to motivate their students' learning [5].

According to the findings of observations made during the learning process of the electric lighting installation, there are several problems. First, the low activity of students in sharing information during the process of learning is caused by several factors, such as the condition of students who mostly do not have manuals, the fact that students do not take the initiative to study independently or in groups, and the fact that students rarely do assignments given by the teacher. Second, the low student learning outcomes are caused by students' lack of understanding of the concept of IPL lessons, so that during exams many students get low scores. Based on the learning outcomes obtained by students with learning outcomes below the Minimum Completion Criteria (KKM) limit, around more than 65% were achieved. The school sets productive subjects as the KKM that students must achieve, which is 75.

Based on the problems that have been presented, the PjBL learning model is applied to IPL learning. Learning activities are heavily influenced by the teaching model used by teachers. The ability to teach using the right model is a demand that must be met by a teacher in carrying out the process of teaching and learning activities because the teaching model is one of the things that can affect student learning outcomes. The learning model applied so far is still conventional, so the learning outcomes are not satisfactory, and students are saturated with the model. In addition, students seem less creative and active, work less together, and participate less in learning. Therefore, a model for learning is implemented that can improve student cooperation and activity. The project-based learning paradigm is more student-centered, so students are required to be more active in learning. Students are invited to plan projects with cooperation between

Table 1. Research Design

Pre-test	Treatment	Post-test
O ₁	X	O ₂

students. Thus, in this article, the application of PjBL to IPL's learning is examined to improve creativity and learning outcomes. According to the study's findings, there were notable disparities between students who participated in PjBL and those who were taught conventionally, both in terms of learning outcomes and critical-thinking abilities [6].

2 Method

This type of research is a quasi-experiment with a design of one group pretest and one group posttest. The study design used a one-group pretest–posttest with one subject group. The research subject consisted of one class in Vocational High School 5 Padang, namely X Listrik 1, which totaled 30 students. The determination of the subjects of this study was not based on the ranking of student learning outcomes, so there was no grouping of high-achieving students or low-achieving students. Meanwhile, the trial class is X Listrik 2, which has 20 students. First, measurements are taken, and then they are subjected to treatment for a certain period of time. Next, a second measurement is taken after the subject is given treatment. In this study, a group of subjects was treated by applying PjBL to IPL learning. The research design is described in Table 1. The instrument used in the study is the observation method, which is in the form of performance assessment using criteria (rubrics).

Explanation:

- O₁ : pre-test value before treatment
- O₂ : post-test value after treatment
- X : treatment by applying PjBL

3 Results and Discussion

Data on learning outcomes were obtained after being given a performance assessment in the sample class. The assessment given (pre-test) is in the form of questions given before starting the lesson and the criteria (rubrics), with a total of 20 assessment criteria. The assessment was conducted with 30 students. According to the research's findings, the average practical learning outcomes of students in the experimental class were $\bar{x} = 65,03$, and the standard deviation was $S = 6,01$ with a sample size of 30 students. The distribution of frequency data can be seen in Fig. 1.

In Fig. 1, the highest number of scores achieved by students is at intervals of 67–70. The highest score obtained by students is 75, while the lowest score obtained by students is 55, with the total number of students in the experimental class being 30 people. There are still many students who have not reached completion; the average score is still below KKM, which is 75.

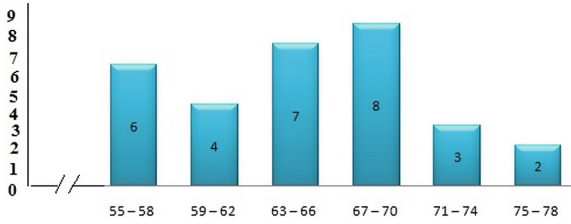


Fig. 1. Pre-test Score Histogram

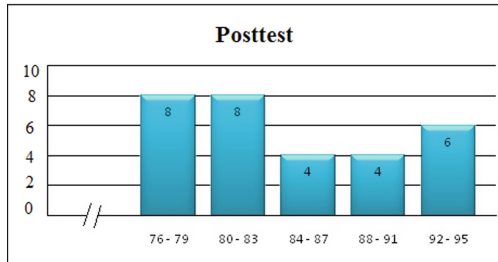


Fig. 2. Post-test Score Histogram

After applying PjBL to IPL learning, the average learning outcomes of experimental class students were 84.43. With a total of 30 students, the outcomes of the final test (post-test) or test held after students are given treatment in the form of project-based learning obtained the maximum score of 95 and the minimum score of 76. With statistical calculations, the average result of the post-test score $\bar{x} = 84,43$ and the standard deviation $S = 6.03$ were obtained. The distribution of frequency data can be seen in Fig. 2.

In Fig. 2, the highest frequency was achieved by students with interval scores of 76–79 and 80–83. The post-test results show that the learning outcomes of all students were above the specified KKM. Thus, it can be stated that with the application of PjBL to IPL learning, the learning outcomes of all students are 100% complete. The findings of the study on the use of PjBL to IPL learning are consistent with the findings of previous studies [7–11], and [12] stated that PjBL can improve student learning outcomes as well as students’ psychomotor competence in learning. PjBL is a paradigm of learning that puts emphasis on effective learning [13–15].

The results of psychomotor learning in IPL are seen after using a project-based learning model in experimental classes. In project-based learning, students are given complex, difficult-to-complete, but realistic tasks or projects and then given enough help so that they can complete the task. This project-based learning technique promotes creativity, independence, responsibility, self-confidence, and critical and analytical thinking [16]. Students receive a true learning experience in accordance with the needs and difficulties that are now present inside the PjBL framework that is being used [17].

Related to psychomotor learning, project-based learning is better because it is able to make students more active and develop their creativity in planning and completing a project, so that learning will be more meaningful for each student. In accordance with the

principles of project-based learning itself, namely (a) centrality, (b) driving questions, (c) constructive investigation, (d) autonomy, and (e) realism. Project-based learning is student-centered, as students design projects and complete them on their own so as to increase their creativity in problem solving. The project that students do in IPL is a real project in the form of installing lighting and electrical installations in miniature houses. Students design component layouts as well as create single-line diagrams, wiring installation diagrams, and recapitulations of funds and materials used in the installation of lighting and electrical installations in miniature houses. On a given project, students can complete all work according to applicable standards and regulations (PUIL). Thus, project-based learning is able to make learners more active [18]. Project-based learning can develop students' creativity in planning and completing a project [19, 20]; so that learning will be more meaningful for each student.

4 Conclusion

It is possible to draw the conclusion that PjBL can enhance student learning outcomes and creativity in IPL learning based on the findings of research on the use of PjBL to this type of instruction. PjBL can improve student performance in completing projects; as well as preparation for the use of tools and materials and the use of tools that are in accordance with their functions, it is also necessary to use procedures for using tools and installing materials. Teachers, as educators, should be able to select the appropriate learning model based on student characteristics and learning materials, ensuring that learning occurs optimally and that learning objectives are met. Students should be able to play a more active role in learning because the learning paradigm requires students to be more active in carrying out learning.

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