Implementation of project-based learning method to increase transferable skills of vocational high school students

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Abstract. Instead of reducing the unemployment rate, Center Berau of Statistic (BPS) 2018 data shows that Vocational High School (SMK) graduates contribute high to the number of unemployed in Indonesia. The high number of unemployed is partly due to the low technical skills and transferable skills of students. Transferable skills are considered very important to strengthen and complement technical skills, amid the disruption of the world of work in the industrial era 4.0. In order to strengthen transferable skills, innovative learning methods are needed, which involve active student participation. The One Group Pretest-Posttest experimental research was conducted to find out the increase in transferable skills of SMK X students in the Building Design and Information Design Study Program (DPIB), through the implementation of project-based learning methods. The results of the gain index analysis, hypothesis testing, and observation results indicate that the application of project-based learning methods can improve the transferable skills of vocational students.

1. Introduction
Vocational High School (SMK) graduates can be the productive labor accordance with the competency of expertise. Another expectation from Vocational High School (SMK) can reduce unemployment rate because they skills they have can fill the available employment opportunities. Based on Center Berau of Statistic (BPS) 2018 data shows the reality are inversely proportional. The unemployment amounted to 11.24% came from Vocational High School (SMK) graduates and the number of unemployed who came from High School (SMA) graduates was 7.95% [1].

The cause of the high contribution of vocational education to the number of unemployed in Indonesia according to Yahya, is due to the low special skills and transferable skills [2]. The low transferable skills felt by labor / company users on the performance of SMK graduates, explained Rahayu and Nuryata labor / company users complained about the behavior of SMK graduates in the workplace [3]. Such as SMK graduates can work well, smart and skilled but not honest, undisciplined and unable to work together.

The definition of transferable skills explained by Copland in Nurul et al. is skills that can be transferred at the workplace to completed work, these skills include creativity, critical thinking, communication, collaboration, decision making, and leadership skills. Transferable skills are considered very important because they can strengthen the technical skills of students in preparing to enter the workforce and as a key to success in the industrial era 4.0 [4]. Based on the explanation of the World
Economic Forum article in Kompas to be able to adapt in the 4.0 industrial revolution, a worker must have skills that cannot be performed by machines [5]. Transferable skill attributes that must be possessed by students according to Sharma in Razak and Sumar are the ability to communicate, think solve problems, work in teams, lifelong learning and information management [6].

Formal institutions such as schools are the most conducive media to hone students' transferable skills. However, the learning process in schools, especially in Vocational Schools still does not pay attention to transferable skills, learning process still emphasizes the provision of technical and academic skills in accordance by the competency of expertise. Explained by Mariah and Sugandi practical learning is still individualized with one-way communication, and job sheets are not used during practical learning, the teacher's verbal to the explanation of the assignment. Students do not pay attention to quality standards, the quality of the work is only to get academic achievement scores [7].

According to Asan in Trianto project-based learning focus on creative thinking, problem solving, and interaction between students and peers to create and use new knowledge. Project-based learning methods are also considered to have great potential to make learning experiences interesting and meaningful for students to enter the workforce. So that project-based learning methods provide opportunities for students to explore knowledge based on their own experiences after doing project work [8].

The results of research conducted by Nurfitrianti [9] stated that the learning model of project based learning affects the ability to solve mathematical problems using the Posttest-Only Group Design research method and the results of research conducted by Rachmawati et al [10], that project-based learning can improve scientific creative thinking skills and scientific critical thinking in the current category using the One Group Pretest-Posttest research method. Both studies research some of the transferable skills, namely creative thinking skills and problem solving abilities. From the results of previous studies it can be seen that project based learning can improve creative thinking skills and problem solving abilities.

2. Methods

The research method used in conducting this research is the experimental research method Pre-Experimental Design, a research method that has no control variables and the sample is not randomly selected. The form of design used is One Group Pretest Posttest Design, in this design there is a pretest before being given treatment, thus the results of the treatment can be more accurate because it can compare with the situation before being given treatment [11].

The method is designed in such a way as to determine the different states of transferable skills. The initial stage is to measure the state of students' transferable skills (pretest) before using project based learning methods. Furthermore, learning uses project-based learning methods for three meetings and the final stage is to re-measure the state of students' transferable skills (posttest). The pretest and posttest that apply are test questions, which are obtained before and after treatment. The results of the study compare the results of the first study before being treated with the results of the assessment after getting treatment.

The implementation of project-based learning methods to improve the transferable skills of students is doing in 6 stages in 3 meetings. Three meetings were held in applying project-based methods based on students' pretest results which showed that the transferable skills of students were still in the low category. So that the application of the stages of the project-based learning method must be applied in 3 meetings, so that the transferable skills of learners are maximally trained.

Processing increases in transferable skills can be calculated based on normalized gain scores. The pretest and posttest results are calculated by the formula N-gain factor. Data obtained from the observation sheet were analyzed by adding many checklists in each column for each indicator of the transferable skills attribute.
3. Result and discussion

The implementation of the 6 stages of the project-based learning method is in line with the steps of the project-based learning method according to Hariyanto and Warsono, that is planning, creation and application, and processing [12].

At the planning stage, students choose a topic, look for sources related to relevant information and organize information sources into a useful form. In the creation and application stages, students develop ideas about the project to be made, combine all contributions from group members and start project work. At the processing stage, the project results are displayed and discussed with other groups so that there are questions and answers and providing input to the project results.

At each stage of the project-based learning method stage, there are transferable skills needed. The transferable skills communication skills are needed in the first to sixth stages, except for the fourth stage because at this stage the activities carried out are to monitor students in the progress of the project. Learners report on the progress of the project and discuss or ask for input if there are obstacles.

The need for communication skills is supported by an explanation of Marfuah's research which says that communication skills can help and facilitates students to express ideas and exchange information with teachers or students [13]. The Organization for Economic Co-operation and Development (OECD) in Aulia, et al. [14] said communication skills are very important because everyone has the need to express ideas, help in the process of composing thoughts and is also a basis for solve the problem.

The transferable skills attribute of thinking and problem solving skills are needed in the first and fourth stages. At that stage students solve the problems given by researchers and discuss if there are obstacles in project work. Basically according to Dahar thinking skills and problem solving are the main objectives of the education process because they practice how to think and reason in drawing conclusions, developing problems, and developing the ability to convey information in communicating ideas [15].

The transferable skills of work skills in a team are needed in the second to fifth stages, because at that stage students begin to work on projects with their respective responsibilities and present the results of the project. Work in teams is needed so that the project planning that has been prepared can run well.

The need for work within a team in a group is strengthened by the explanation Widyaningtyas and Farid said working in a team can be a necessity for work success. Work in teams becomes a driving force that has energy for individuals and without good cooperation will not bring bright ideas. With the work in the team according to Rahayuni in Sari can make participants active in learning so that teamwork becomes an internal factor that influences learning success [16].

The transferable skills of information management skills are needed in the first and second stages, at that stage the students do problem solving when starting project planning. Good information management can support students in problem solving. According to Zurkowski in Pattah said that information management is the ability that utilizes information as well as the main sources to solve problems. The information that has been obtained is effectively evaluated to solve problems and make decisions [17].

With the need for transferable skills at every stage of the implementation of project-based learning methods encourage students to actively manage classroom learning in doing project work. Nurfitriyanti [9] also states that by working on projects, students are encouraged to use their existing knowledge to find solutions to existing problems.

From the results of the pretest and posttest obtained an average value of 51.9 and 78.9. Based on these results there is an increase in the average value between the pretest and posttest. Significant differences in the results of the pretest and posttest on the increase in transferable skills can be seen from the results of the gain index analysis which shows the results of 0.56 in the medium category.

The average results of observations of transferable skills of students in the attribute of communication ability that is equal to 50.51% are in the sufficient category. Attributes of thinking and problem solving skills are in the sufficient category with a percentage of 51.05%. Work attribute in the team is 71.21%, are in the high category. The information management attribute that is equal to 49.98% is in the sufficient category.
Overall transferable skills improvement based on pretest, posttest and observation results are in the moderate/sufficient category. One factor in the occurrence of transferable skills is in the sufficient category, which is the adaptation factor. So students, when the learning method takes place, are not fully accustomed to being more active. Project-based learning methods were first applied to students who took technical drawing subjects, so students were not accustomed to learning that began with problem-solving questions and project work.

In the research of Liawati et al. mentioned that the successful implementation of project-based learning methods in the high category was seen after three times the application of project-based learning methods. When the learning application is first implemented, the cognitive, psychomotor and affective learning outcomes of students are in the moderate/sufficient category. To improve student learning outcomes, Liawati, et al. does additional stages, namely providing a material explanation at the beginning of learning and monitoring students during the planning stage to the project implementation stage. Student learning outcomes are still in the category of moderate/sufficient when applying the second learning method implemented. When the implementation of learning was carried out the third time, there were no additional stages. Student learning outcomes also increased in the high category [18].

In line with Rachmawati et al. said that in the application of project-based learning methods, time allocation is needed to optimally increase transferable skills. Rachmawati's research on the application of project-based methods to improve the ability of scientific creative thinking and scientific critical thinking is increasing in the low category. The cause of the increase in scientific creative thinking skills and scientific critical thinking is in the medium category due to the very short learning implementation time so students have not been optimal in giving ideas to solve their problems [10].

The application of project-based learning methods to improve transferable skills is in the medium category, in the study of Sofyan et al. are considered effective because ≥75% of students have n-gain in the medium category. It is the same as this study, which is 72% of students have a medium category n-gain. Sofyan said the effectiveness of the implementation of the project-based learning model was caused by the fact that there were a sheet preparation and division of tasks in groups that made students focus on problems, planning, and completion in working on the project [19].

Improved transferable skills of students occur after the implementation of project-based learning methods because project-based learning methods encourage students to explore knowledge and hone skills independently. In Pranjono's research it states that project-based learning is feasible because: (1) students can cooperate when practicing because of group coordination, (2) developing students' creativity in learning, (3) students learn to plan activities thoroughly before working on a project, (4) stimulates thinking to do more active learning activities [20].

Learning that involves students actively in research conducted by Setiani and Rasto said that the learning process that involves students actively, attracts students' interest and attention, arouses students' motivation, applies the principles of individuality, and shows in teaching is a vehicle which is effective for increasing the transferable skills of vocational students [21].

4. Conclusion

The results obtained that the project-based learning method affects the transferable skills of students. The following conclusions are obtained by researchers:

- The implementation of project-based learning is carried out in 6 stages, and at each stage, there are transferable skills needed.
- Implementation of project-based learning methods can improve students' transferable skills.

An increase in students' transferable skills after the application of project-based learning methods is due to the project-based learning methods of students actively involved in learning so as to attract students' interest and attention and arouse students' motivation.
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