Project-based learning to enhance student’s awareness towards the environment

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Abstract. The research aimed to enhance student’s awareness toward the environment through project-based learning. In learning process students are expected to solve school environment problems of waste management. The study was conducted on the students of grade X, in one of the Vocational Schools in Indonesia for 3 meetings. Students are given worksheet as a guide for designing waste treatment projects. The researcher used six stages namely: 1) Design purpose; 2) Inquiry field; 3) Solution; 4) Choosing the preferred solutions; 5) Operation step; 6) Evaluation. Indicators of awareness toward the environment used Dunlap and Liere instruments, including: 1) fragility of natural balance in the school environment; 2) ecological crisis in the school environment; 3) the reality of limited natural resources in the school environment; 4) Anti-anthropocentrism of students in the school environment; 5) rejection of exceptionalism. The results showed an increase of awareness towards the school environment with N-gain score category is medium (N gain= 0.41). Students also appreciate and maintain the school environment.

1. Introduction
Natural Sciences is not only a collection of knowledge in the form of facts, concepts and principles but also a process of finding out nature in a systematic way [1]. One of natural science branch is Biology. Biology learning is very close to students world. The source of learning can come from anything that is in itself as an organism and the natural environment around it. Events related to Biological concepts can also be learned through problems that occur in the environment around the students themselves [2]. Thus far the learning method still hasn’t created a learning condition that is able to make students active. Students still receive that material from the teacher. According to [3] many Biology subject tends to be contextual. So, the lack of thinking development efforts that guide students to solve a problem. Therefore, a way is needed to solve this problem by providing learning facilities to students who can optimize their creative thinking skills and awareness for the environment through Project Based Learning.

Project Based Learning can be called as a teaching method where students gain knowledge and skills by working for long periods of time in order to investigate an object. They will be interest, new questions, new problems, and challenges. According to the [4] which suggests Project Based Learning as a dynamic learning approach, where students actively explore a problem and gain deeper knowledge. Project-based learning prepares students’ concern in building and applying concepts from the results of exploration and problem solving during project completion independently. Besides that it was found in [5] research which suggested that learning by implementing project-based learning can
increase student awareness of the surrounding environment, there was a significant increase in awareness attitudes before and after the implementation of project-based learning. In this research we used different instrument (Doppelt; Dunlap and Liere) that more covers about student awareness toward environment and we have done at vocational school.

Students' concern is not only the responsibility of the school environment, but also an internal encouragement to preserve, prevent and understand the importance of protecting the environment [6]. The results of the research by [7] support the previous statement, that the implementation of project-based learning models improves the ability of creative thinking and caring, from a less creative level to being quite creative in the matter of waste pollution and recycling. Waste is a material that discarded or wasted from the results of human activities that have no economic value [8].

2. Methods
The research design was quasi-experimental, pre-test and post-test control group design [9]. The experimental class was done by Project Based Learning using a set of experiment. The research was conducted at the one of Vocational High School in Bogor. The population were students 2nd Semester in grade X APH-3. The materials test contained of subject of Biology Education, waste management. The test instrument consist of five questions based on indicators of awareness for the environment used by [11], as follows: 1) fragility of natural balance in the school environment; 2) ecological crisis in the school environment; 3) the reality of limited natural resources in the school environment; 4) Anti-anthropocentrism of students in the school environment; 5) rejection of exceptionalism. It used for measure student’s awareness. The results of the data regarding student answers, then processed, analysed, and performed statistically to find out students' concern for awareness of the environment.

The learning of the research used six stages according to [10], namely: 1) Design purpose; 2) Inquiry field; 3) Solution; 4) Choosing the preferred solutions; 5) Operation step; 6) Evaluation.

3. Result and Discussion
This part informs the results and discussion about project-based learning in improving awareness towards school environment. Learning is carried out in the APHP-3 class. Before starting the learning activities regarding waste material, the initial test was done first. This initial test is to find out students' initial understanding and abilities regarding waste. In the stage of making the project each group is given a worksheet. Every question on the worksheet has been designed to help students during the project creation process. Students directed step by step on each question in worksheet. Each student group makes a different product. Furthermore, the teacher explains in detail the material regarding waste starting from the definition of waste, types of waste, characteristics of waste, waste management, as well as impacts on humans and the environment. The third meeting, each group presented the results of the discussion. T he students presented group discussions then the teacher evaluated the learning outcomes. Eventually the last meeting, the teacher gave the post-test questions and questionnaires to each student. Here's the values’ graph:
Figure 1 shows an increase of awareness towards the school environment. Based on the graph, every student’s value has been increased. We can conclude that the implementation of project based learning and the instrument are awareness bolster. The data of pre-test was collected and analyzed to determine the students’ awareness before this research was conducted. Thus, the instrument tested the research hypothesis. The research hypothesis is: hypothesis null, the project-based learning significantly diminishes the student’s awareness about the environment and 2nd hypothesis, the project-based learning significantly enhances the student’s awareness about the environment. After the calculation, the result can be seen in Table 1.

Table 1. Descriptive Statistic of Students’ Awareness through Project Based Learning

|          | N  | Minimum | Maximum | Mean  | Std  |
|----------|----|---------|---------|-------|------|
| Pre-test | 11 | 0.00    | 5.00    | 2.27  | 1.20 |
| Post-test| 11 | 1.00    | 5.00    | 2.91  | 1.51 |

The result in Table 3 shows that the data is normal distribution at the level of significance $\alpha = 0.05$. The two groups of normalized gain data of the project-based learning enhance the student’s awareness about the environment having a homogeneous variance. The hypothesis null is rejected; it means that the project-based learning enhances the student’s awareness about the environment. The result also shows that the enhancement in medium (0.41) by N-gain category [12].

4. Conclusion

The research conclusion is the project-based learning enhance the students’ awareness towards the school environment with N-gain category is medium (N gain= 0.41). Even though the research result can’t show that the project-based learning significantly enhances the students’ awareness towards the school environment. But the research can give insight that students appreciate and maintain the school environment.

5. References

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