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THE EXPERIMENTATION OF PROJECT BASED LEARNING BASED-ECO-CAMPUS TOWARD THE STUDENTS' PROBLEM SOLVING SKILLS AND THE EMOTIONAL ENVIRONMENTAL CLIMATE

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Abstract

The purposes of this research were to improve the students' problem-solving skills, and classroom emotional environment climate using project based learning models on the environmental issues material. Subjects in this study were students of S-1 Biology Education Department in University of Muhammadiyah Sukabumi. The method used in this study is a quasi-experiment with two sample classes and using pre-test post-test control group design. Data were collected by using a task of problem-solving skills, emotional environment classroom climate's questionnaire and interview guides. Implementation of the study began with a pretest continued with learning activity and ended with posttest. The results showed that problem-solving skills and emotional environment classroom climate have improved both in the experimental classroom and in the comparator classroom. The significance test results by using a Mann Whitney non-parametric test showed that problem-solving skills and emotional environment classroom climate in the experimental class were differ significantly with the comparator classroom. Students responded positively to the model of project-based learning.

Keywords: Project Based Learning, Problem-Solving Skills, Classroom Emotional EnvironmentalClimate, Environmental Issues Material

INTRODUCTION

The result of the need assessment that has been done in one of the universities in Sukabumi through the distribution of questionnaires given to the students about the lecture of Environmental Knowledge is the most (78.5%), students stated that the lecture of Environmental Knowledge uses the lectures, discussions, and questions. For practicum of Environmental Knowledge, the most (85,5%) students stated that the lab was conducted according to the practice manual made by the lecturer.

From the facts about the learning problem, of course required the implementation of a learning modelthat appropriatelyand able to improve students' ability to solve problems, collaborate, communicate, and knowsconcept well. One of the learning models that can be used is the model of Project Based Learning (PjBL). PjBL is a structured pedagogy, involving students in learning knowledge, attitudes and skills through an inquiry process using authentic questions, creates the products ranging from planning, designing, creating products, and reflecting the product creation so that the students can experience more interesting and meaningful learning (Gaer, 1998; Doppelt, 2005; Higher Education 2008). PjBL treatsthe students to extent the knowledge horizons of a particular subject or lesson. The knowledge gained becomes meaningful and the learning activities becomes interesting, because the knowledge is useful for them to appreciate their environment, understand and solve the problems encountered in daily life.

The success of a project involving the group will be influenced by many factors. One of the factors that influenced it was the emotional environment climate that was formed during the project activity. In the execution of projects carried out in the groups need cooperation to achieve the common goals that have been determined by the group. In order for reaching the success cooperation, the group members should have an open attitude, mutual support and acceptance, and need each other mutually. These attitudesisthe aspects of the emotional environmental climate that is very useful for achieving common goals in learning activities.

PjBL is an attempt to create the new relevant learning practices that involve aspects of the environment in which students are located and learn, including the campus and surrounding environment in which this research is conducted, by combining PjBL with an eco-campus program that is being piloted on campus where the research is conducted. Eco-campus is defined as a

caring and cultured environment campus and has carried out the systematic and sustainable environmental management. Eco-campus is a reflection of the involvement of all academic community who are in the campus environment to always pay attention to aspects of health and the environment around it.

The purpose of this research is to know the problem solving ability, the concept understanding, the students' emotional environmental climate. In addition, this study aims to examine the relationship between the conceptual mastery and the classroom emotional environment climate that is formed with the students' ability to solve problems.

METHODS

The research method used in this research is quasi experiment. The research design used was pre-test post-test control group design adapted from Sukmadinata (2006). Subjects in this study are the students of Biology Education departmentof University of Muhammadiyah Sukabumi. The total is 40 people divided into 2 classes, each 20 people per class.

The research instruments consist of: 1) Essay test of the problem solving skills with five measured indicators, ie identifying problems, collecting data/ information, analyzing data, providing solutions, and evaluating (Mashudi, 2000); 2) Closed questionnaire used to measure the classroom's emotional climate. The aspects of classroom emotional environmental climate studied in this study including trust and cohessiveness. The level of trust consists of openness, sharing, acceptance and support (Johnson & Johnson, 1975); And 3) Interview guidance to know the student response about the model of PjBL that has been implemented.

The quantitative data were analyzed by statistical test. Statistical data processing is conducted by using Statistical Package for Social Science (SPSS) software for windows version 22.0 and also done manually by using Microsoft-Excel 2007. The qualitative data were analyzed descriptively to determine the trends that emerged during the research.

RESULTS AND DISCUSSION

1. Problem Solving Abilities

The results showed an increase in the students' ability to solve problems in each class, as shown in Table 1 below.

Table 1. Recapitulation of The Values of Problem Solving Ability

Class	Pre-test	Post-test	N-gain	N-gain Category
Experimental	50,00	83,13	0,66	Medium
Comparison	49,58	62,29	0,26	Low

The average pretest marks in the experiment class is 50.00 and the comparator class is 49.58. According to

Arikunto (2002), the values are low. However, after the learning process, the average grade of ability to solve the problems of experimental class to 83.13 (good category) and in the comparator class becomes 62.29 (medium category). In each sample class, the value of solving problems' posttest is higher than pretest.

Based on the results of statistical analysis obtained U_{count} value = 98 $<U_{tabel}$ = 127 then H_0 rejected, meaning there is a significant difference between the value of n-gain ability to solve the problem of experimental class and comparison class. Since the n-gain value in the experimental class is greater than that of the comparison class, the learning using the PjBL model in the experimental class is better than the comparison class. An increase in the indicator of problem solving ability in the experimental and comparison classes can be seen in Figure 1.

1. Climate Emotional Environment of Student Class

The results showed an increase in students' environment emotional climate classin each sample class as shown in Table 2.

Table 2 Recapitulation of The Values Calculation inClass Emotional Climate

Class	Pre-test	Post-test	N-gain	N-gain Category
Expe-rimental	54.29	80.00	0.56	Me-dium
Com-parator	53.38	64.46	0.23	Low

The average value of pretest in the experimental class is 54.29 and in the comparator class is 53.38. After learning on environmental issues, the average value of the environmental climate of experimental classroom was 80.00 and the comparison class became 64.46. Based on these data, in each sample class, the emotional climate value at posttest is higher than pretest.

Based on the statistical test results obtained U_{count} value = 90 <Utable = 127 then H_0 is rejected, meaning there is a significant difference between the value of n-gain of the class emotional climate of students in the experimental class and the comparison class. Since the n-gain value in the experimental class is greater than that of the comparison class, the learning using the PjBL model in the experimental class is better than the comparison class. The dynamics of increasing the average of the emotional environment climate of the initial and final classes of experimental class and comparisonclass can be seen in Figure 2.

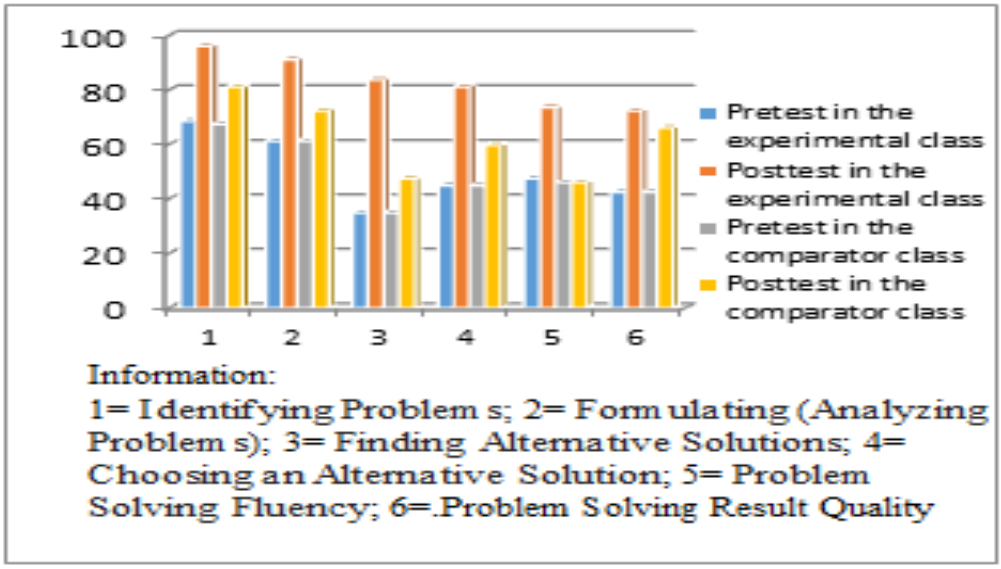

Figure 1. The Graphicof Average Pretest and Posttest Valuesfor Each of Indicator from the Ability of Problem Solving in Experimental and Comparison Classes

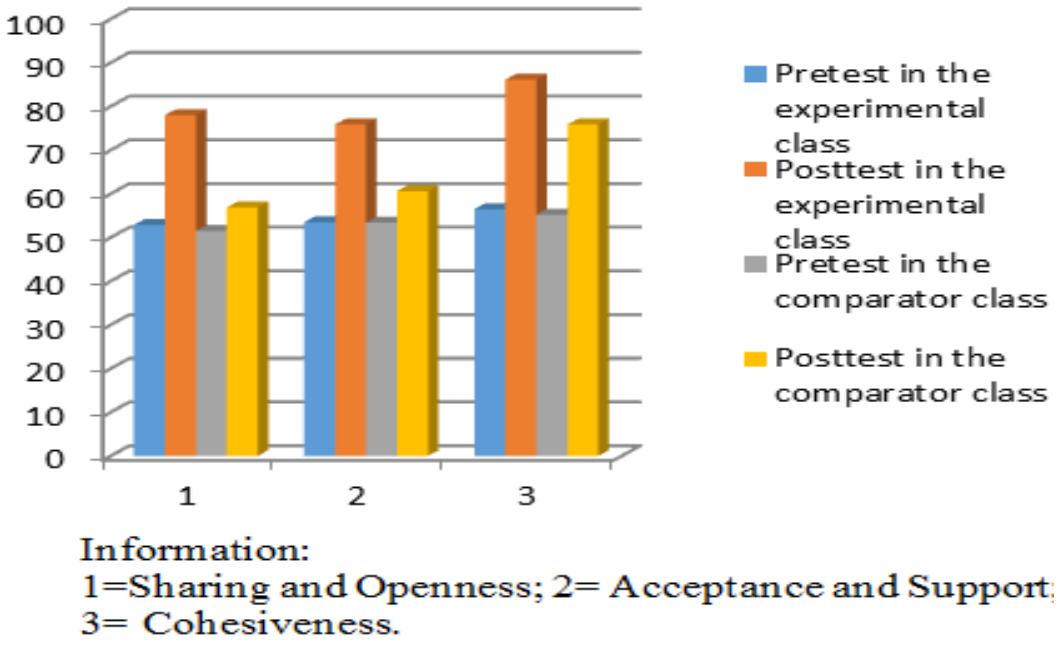

Figure2.The Graphic of Average Values of Pretest and Posttestfor Each of Indicator on The Students' Emotional Climatein Experimental and Comparison Classes

The learning using the PjBL model in the experimental class is able to improve problem-solving skills because the PjBL model synchronizes the ability to solve problems, such as in formulating problems and finding solutions to solutions. This is in line with Hung & Wong's (2000) opinion that project work can be seen as an open-ended contextual activity based learning and is part of a learning process that provides a strong emphasize on problem solving as a collaborative effort undertaken in the learning process in certain period.

Furthermore, according to Buck Institute of Education/BIE (2007), PjBL has an advantage in supporting students to learn and practice their skills in problem solving, communication and self-management. PjBL allows students to plan, execute and reflect on project creation results, so it is certainly possible to identify and formulate problems as well as high scores as illustrated by the results of the research. In working on projects, students can collaborate with one or two lecturers, but students conduct the investigations in collaborative groups between four and five students. With the activities of this group will facilitate students in finding the alternative solutions as illustrated by the high indicator of ability to solve this problem on the results of research in the experimental class.

The PjBL model in this research has advantages and disadvantages. One of the weaknesses of project-oriented learning is that it is likely that only some of the brightest students are actively involved in the development of general principles, and most of the students are silent, passive, while waiting the brightest students to state the general rule. If this happens then it can be certained that the openness and togetherness of students in an effort to solve common problems will be reduced. Precisely what will happen is the attitude of mutually rely on one and the other. Furthermore, togetherness and openness will also be influenced by other factors, one of which is the condition of interaction within the group.

The risk of randomly grouping is the appearance of likes and dislikes toward fellow group members. This factor obviously can not be ignored in forming aspects of openness and togetherness among members of the group. The differences of openness and togetherness level among groups in the classroom show the varying emotional climatic conditions formed in each class. Conditions and the proximity among fellow group members may be the main trigger for different levels of openness

and togetherness in one group to another group.

The PjBL model in this study is a new form of learning introduced to students in the experimental class. In this study each group of students get "pressure" to complete the task or problem faced. If still in the appropriate proportion, the existing pressure will have a positive impact. Each member of the group will need each other and support each other to solve the problems faced by the group. This would be the opposite if the student's pressures were too heavy. Each member of the group will eventually rely on each other. The habituation of a method or the learning models in the end is necessary to form a climate condition of the emotional environment of a good and conducive class.

The students which have been interviewed revealed that during the learning process using PjBL, the conditions in the class especially in the group become more fun because there are responsibilities that must be conducted together in a long time. PjBL can also provide a pleasant environment for the application of a skill. It is more important to point out that PjBL can improve the quality of learning and guide students to achieve the higher cognitive levels.

The advantages and disadvantages of the PjBL model for each student are different. The results of the interviews indicate that some students supposed that one of the advantages of PjBL in learning process is to produce the work. In addition, theinteraction process with outsiders to be one of the PjBL's advantages according to students. With the interaction to outsiders, students can learn to communicate and negotiate. The disadvantages of PJBL model based on the interview result is the difficulty in formulating the project to be implemented, other parties that are not easy to be involved, such as stakeholders in the campus environment when will implementing the projects related to the eco-campus program.

CONCLUSION

From the results of the research and discussion that has been presented, it can be concluded that the learning by PjBL model based on eco-campus is more influential in improving problem-solving ability, and the emotional environment climate of student class on environmental material than the creative and productive learning model in comparison class. If intending to do a similar research then it is advisable to do the preliminary study on the sample class that will be examined in order to minimize the problems that arise related to the use of PjBL model. There are

other abilities or characteristics, such as creative thinking and critical thinking, which still need to be traced to similar research.

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