

CHAPTER I

INTRODUCTION

A. Background

Knowledge is generated through experience, connecting the ideas they encounter, such as in a classroom context, with the concrete (Piaget, 1963). This meant that knowledge and understanding come through discovery rather than repetition of facts. According to the *Badan Standar Nasional Pendidikan (BSNP)* year 2006 science subjects for secondary level should be developed through analytical thinking skills, inductive, and deductive reasoning to solve problems related to daily natural events. Department of National Education (2007) also set the paradigm of science through education which put education as tools for empowering students' potential to solve daily natural problem. Based on those statements, it is known that science is very important to be learned by students in secondary level to solve some daily natural problems.

To solve complex problems, students are required to have both fundamental skills such as reading, writing, math, and some 21st century skills (collaborative skills, engagement and motivation, and critical thinking and problem solving skills, research gathering, time management, information synthesizing, and utilizing high technology tools). By combining those skills, students become directors of their own learning process, guided and tutored by a skilled teacher (The George Lucas Educational Foundation, 2007). Factually, a conventional learning which passively learning facts and reciting them out of context is no longer sufficient to facilitate those skills to be obtained by students. Therefore it is necessary for teachers to find an appropriate innovation of teaching strategies which bridge students in secondary level to have those skills.

Based on King *et.al* (2009) teaching in the middle school years (secondary level) is challenging. Teacher struggle with keeping students academically engaged during some years of tremendous change. A project build on authentic learning tasks that engage and motivate students, middle school is an ideal time

to integrate project in their learning. Projects encourage students to invent, and struggle with important and essential ideas. Through such projects, students work in a group to solve authentic and interdisciplinary issues: determine how to approach an issue, what kind of activities to perform, collecting data from various sources and analyzing/ synthesizing their findings to produce new information (Solomon, 2003).

Project-based learning is an instructional model that provides students with complex tasks based on challenging questions or problems that involve the students' problem solving, decision making, investigative skills, and reflection. Project-based learning hails from a tradition of pedagogy which asserts that students learn best by experiencing and solving real-world problems (Barron & Darling-Hammond, 2008; Thomas, 2000). Teachers can create real-world problem-solving situations by designing questions which involves a complex task and some forms of student presentation, and/or creating an actual product or artifact which engage students in creating, questioning, and revising knowledge, while developing their skills in critical thinking, collaboration, communication, reasoning, synthesis, and resilience (Barron & Darling-Hammond, 2008).

Some related researches about project-based learning also have been done by several researchers. Based on Larasati (2010), the project-Based Learning model can improve conceptual understanding as well as learning motivation of junior high school students in diversity of living things concept and the students' response towards project-based learning has given positive result to their learning motivation. Another research (Mahira, 2012) analyzed the students' improvement of problem solving skill through project-based learning in environmental pollution concept. The result showed there is improvement in problem solving skill as much as 12-16% in each stage. Those researches showed that there are some collections of skills that can be obtained through project-based learning implementation.

The skill set for project-based learning is diverse includes science and technological literacy and group process skills. Throughout the process students

will engage in and develop proficiency in these types of skills: comprehension skills, research and writing skills, questioning skills, group processes/ collaborative learning skills, sequencing and chronology skills, skills with resources such as maps and globes, skills with presentation tools such as charts and graphs, analysis skills, communication skills, problem solving and critical thinking skills, task and self-management skills (King et. al., 2009). However, the skill set which is needed to be mastered by students already listed in every instructional curriculum and some adaptation should be considered.

Considering that curriculum is tentative, the researcher adapts a common world's curriculum, it is based on Cambridge Curriculum. The skill-set that assessed in Cambridge Curriculum for science are knowledge with understanding, handling information and problem solving, and experimental skills and investigations (Cambridge IGCSE, 2010). It provides some learning concepts which learn about daily real world problem in science, one of them is Living Things in Their Environment. The concepts certainly discuss about some topics that strongly focus on solving daily natural event problem in science such as; discussing positive and negative influence of humans on the environment and all of those topics are learned in People and The Planet chapter.

Realizing that the use of Cambridge Curriculum is not really common in Indonesia, the researcher chose one of Private International School which use Cambridge curriculum as its reference. A preliminary study of diagnostic interview had been done in the school to science teacher, the result indicated that ecosystem concept, reproduction system, and solar system are the most interesting topics in science subject. The interviewed teacher stated that by creating project, student will gain certain skill such as: critical thinking, motoric, team work, and problem solving skill. Another result reported that there are 71.4% students which love to work as a group, and 85.7% think that project can create meaningful learning.

Regarding to the curriculum and concept consideration, this research is focused on the implementation of project-based learning based on Cambridge Curriculum on People and The Planet chapter. Compare to another research, this research analyze two variables at once they are students' cognitive achievement and problem solving skill. Developing from those variables this research also investigates the level of problem solving skill of each student and examines the final product of the project itself.

B. Problem

Based on the background which has already stated, the problem of this research is "How is the improvement of students' achievement and problem-solving skill through project-based learning?"

C. Research Questions

Based on the statement of problem, it can be described into several research questions there are:

1. Is the project-based learning model can improve students' cognitive achievement on People and The Planet chapter?
2. Is the project-based learning model can improve students' problem-solving skill on People and The Planet chapter?
3. How is the leveling of students' problem solving skill on People and The Planet chapter through project-based learning?
4. How is the final product of the students as the result of the project in People and The Planet chapter?
5. What is the students' response after implementing project-based learning model?

D. Limitations of Problem

To avoid widening of problem on this research, then the research will be limited for the following things:

1. The stage of project-based learning which is used in this research is based on Aaron Adair and Bao Lei research in 2012.
2. The topics of People and The Planet that will be learned focus on the 3rd subtopics which discuss positive and negative influence of humans on the environment, e.g. the effect on food chains, pollution and ozone depletion.
3. The students' achievement measured is the cognitive achievement based on Bloom's taxonomy (C1-C6) and four different knowledge dimension (factual, conceptual, procedural, and metacognitive)

E. Aim of Research

According to the problem that has been proposed the aim of this research is to investigate the improvement of students' cognitive achievement and problem solving skill through project-based learning model on People and The Planet chapter, furthermore this research is conducted to obtain some other information and arranged as follows:

1. Leveling of students' problem solving skill before and after project-based learning model being implemented on People and The Planet chapter.
2. Final product of the project as implementation of project-based learning model on People and The Planet chapter.
3. Students' response toward implementation of project-based learning model on People and The Planet chapter.

F. Significance of Research

This research is important to be conducted because it is expected to provide some benefits to various sides including:

1. For students, providing a different learning experience by using learning model project-based learning, it is expected to raise students' motivation, to foster the spirit of cooperation, and responsibility within the group or

individual in the learning process, and also expected to improve the mastery of concepts and problem solving skill.

2. For teachers, as innovation to improve students' skills by selecting an appropriate learning model, varied, and innovative ways to be applied in the learning process.
3. For other researcher with the same focus of study, as a reference and source to implement the same learning model which is can be either developed or analyzed.

G. Organization Structure of Research Paper

This research paper is arranged based on its necessity .In order to get organized structure of paper, this research paper is arranged based on the following organization structure:

1. Chapter 1 : Introduction

This chapter elaborates the background of the research followed by the problem proposed as well as its limitation. In this part also explain the aim of the research and the benefit for other parties in the same field of study.

2. Chapter II : Literature Review

It describes some literatures and basic theories of the research. This research is reviewing project-based learning, learning achievement, and problem solving skill. Those theories are used to strengthen or support the data gained from the research in analysis part.

3. Chapter III : Methodology

This chapter examines the step of research procedures, the type of research, how the data will be obtained, what is the object of the research, the instruments, and the research plot.

4. Chapter IV : Result and Discussion

In this part, all of the data from the research will be interpreted as result of the research. The discussion of the result will be followed after, it analyzes the result of research and the correlation between the result and the theories.

5. Chapter V : Conclusion and Recommendation

As its title conclusion and recommendation, in this chapter all of research question will be answered based on the result. The difficulties and obstacles that found in this research will be discussed in recommendation part.

