

CHAPTER I

INTRODUCTION

1.1 Background

The development of civilization today are often deal with many problems to make decision. Education encounters, in modern times, challenges in all aspects of social, economic and cultural life (Aloraini, 2012). In order to deal with the challenges, The 21st century science education requires a lesson that is not only implements curriculum, but also science learning in 21st century requires students to be able to prove the truth of science knowledge (Osborne, 2010). Moreover, According to national curriculum 2013, learning should be directed to build awareness and concern for the environment and required to be active in learning process. Thus, The educators should arrange the learning process to encourage students to develop thinking skills. In line with the purpose of education is how to create a society who has morality through formal education. This situation, teaching science is not only referring to the lesson, but also social interaction in terms of science and society are stimulated and need to make decision in the form of argumentation into school (Nuangchalerm, 2010).

Science aims to complete the problem with concept of science and produce new knowledge of the natural world (Osborne, 2010). Nowadays issue is arising that science must become basic thinking of people to applying in their daily life. However, The last few decades, there is still lack of the quality of scientific argumentation study, and learning science is still dominated by teachers' explanation and only some schools that involve approach argumentation in science learning (Osborne, 2010). Students in developed countries, still focus on concept and principle of science rather than expressing the idea based on the experience, as well as knowledge (Sandoval, 2010). The students still have difficulties applying the concept and solve the problems in everyday life, in making scientific arguments, explaining science phenomena of empirical science in class discussion (Sandoval, 2010). Moreover, The studies have showed that students have difficulties justifying their claims or answers using appropriate scientific explanations (Heng et al., 2014).

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THE PROFILE OF STUDENTS' CONCEPT MASTERY AND SCIENTIFIC ARGUMENTATION SKILL IN LEARNING GLOBAL WARMING AT SEKOLAH INDONESIA KUALA LUMPUR

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Consequently, science teachers are beginning to include the process of scientific argumentation among classroom objectives. This has been difficult, may be due to both relatively low student ability to think critically and to low instructional quality (Frey et al., 2015). Teachers cannot simply focus on explaining the theories, laws, models, and unifying concepts of the various science concept. Therefore, teachers need to provide structured opportunities for students to practice participating in scientific argumentation in order to make them have a chance to learn (Sampson, 2012). Current studies in Malaysia indicated, students tend to follow blindly procedures, provided by teachers or textbooks, carry out experiments and record their observations (Heng & Johari, 2013). Hence, very little time is spent on discussing the scientific ideas behind an experiment and interpreting the findings.

Meanwhile, Findings from current literature indicated that scientific argumentative activities can promote and enhance understanding of scientific concepts (Nussbaum, 2011; Sadler, 2004). Besides, scientific argumentation also fosters students' content knowledge. The ability to construct an arguments is a crucial skill and one of the educational goal in all school subjects including science. It enables students to construct reasoned opinions, idea to deal with the increasing complexity of knowledge and problems (Heitman et al., 2014). The argumentation skill is an important component in scientific literacy, so that by being able to argue, students will be able to master the concepts of science. Thus, the students' argument is important (Erduran et al., 2004).

Arguments that occur during learning process can be identified its pattern. There are several patterns or models of arguments. One of the method to identify arguments is by using TAP (Toulmin Argumentation Pattern). Toulmin's model argument is more appropriate, because this model is the most complete that can be describes the criteria of an argument. By applying the model, an argument is more reliable, credible, less susceptible to rebuttals, and in general more efficient and effective. Thus, the model is useful for ensuring arguments in written documents or presentations are structured logically (Ford, 2012).

There are several advantages for Toulmin models. TAP template has a great degree of specificity (Ford, 2012). The TAP template or some similar form of structure has guided the development of curricular materials, under the idea that a structural template provides a clear set of expectations for the arguments students should construct, suggesting ways to think about what a good argument is in terms of its structural components (Ford, 2012). TAP has also been used to evaluate the quality of argument (Tippett, 2009). This model is more developed, even the quality of argument can be quantitatively assessed from level 1-5, based on the classification analysis framework (Erduran et al., 2004).

In addition, every people should have a right knowledge, skill and competencies that required handle and solve those problems, not only the argumentation skill but also knowledge of the science concept, which focus on cognitive aspect. Cognition is the process of acquiring and understanding knowledge through our thoughts, experiences, and senses. Learning involves acquiring knowledge through experience, study, or being taught (Anderson & Krathwohl, 2001). The construction of scientific arguments requires cognitive involvements, such as analyzing and making sense of the data, generating explanations, supporting the idea, and challenging the validity of an idea (Henget al., 2014). Realizing the argumentation skill and knowledge or concept mastery on science is important. Thus, identification on students' scientific argumentation skill needs to be done, in order to promote the theoretical frameworks which underline the research of argumentation in the science education (Viyanti, 2015).

Based on the importance of measuring students' concept mastery and scientific argumentation skill asserted on the theories, this present study arises "Profiling" as the main focus. Hence, profiling secondary students' scientific argumentation skill is expected to be the best way in figuring out the current condition of students' scientific argumentation skill and concept mastery in science. With current description and specific respondents, the educator can take an actual and on target action for having solution or generating argumentation skill and concept mastery.

Most of conducted study in scientific argumentation skill were concern on analyze mastery level of scientific argumentation among secondary level engaged in verbal argumentations and didn't contain any correlation with the written argumentation (Henget al., 2014; Bathgate et al., 2015). Different with those studies, this reseach also focus for both oral and written scientific argumentaion based on Toulmin Argumentation Pattern (TAP). Moreover it describes the correlation between scientific argumentation skill and concept mastery both in oral and written scientific argumentation skill.

The scientific argumentation related with human life to solve the problems. One of the theme in science is environmental problem which focus on global warming. Global warming cause several natural disasters, the rate of flood was increasing in 2016, and the cause of flooding not only because of the lack of climate problem and urban infrastructure but also from the environmental problem and the behavior of society living in urban areas (Heriyanto,2016). Thus, every people should have right knowledge to solve those problems. In order to cultivate a sense of responsibility among future qualified citizens for the 21st century, many countries have made the awareness and mitigation of global warming main issues in primary and secondary schools' science education (Zeidler, 2014). Thus, it implicates, students' concept mastery in global warming be promoted.

Therefore, in this study, the researcher examine the process of students' scientific argumentation skill in group discussion and essay written test, in order to investigate the domain-specificity and analysis of scientific argumentation in Sekolah Indonesia Kuala Lumpur in Learning global warming. Based on the previous research found students in Sekolah Indonesia Kuala Lumpur (SIKL) come from various cities in Indonesia. They are very different in attitude and cultures, and the way of thinking to expressing the idea. That is why they are mostly more critical and active in arguing something.

In correspond to that, this present study try to focus to analyze the students' concept mastery and scientific argumentation skill both in oral and written argumentation. The researcher also took a closer look at the quality of

both argumentation in science by correlate it with the students' concept mastery in learning global warming. Thus, the main focus of this research is to Investigate the Profile of Students' Concept Mastery and Scientific Argumentation skill in Learning global warming at Sekolah Indonesia Kuala Lumpur.

1.2 Research Problem

Based on the previous explanation in the background, the research problem of this study is "How is the Profile of Students' Concept Mastery and Scientific Argumentation Skill in Learning Global Warming?"

1.3 Research Question

Based on the previously stated problem, this research attempts to explore the following questions:

- 1) How is the profile of students' concept mastery in learning global warming?
- 2) How is the profile of students' scientific argumentation skill in learning global warming?
- 3) How is the correlation between students' oral and written scientific argumentation in learning global warming?
- 4) How is the correlation between students' concept mastery and scientific argumentation skill in oral and written in learning global warming?
- 5) What is the students' perspective towards their scientific argumentation skill?

1.4 Limitation of Problem

In order to avoid a widening problem in this research, then the research is limited to as follow:

- 1) Students' Concept Mastery

Students' Concept Mastery focused on students' cognitive aspect. The result of students' concept mastery refers to Cognitive Revised Bloom Taxonomy which measure of five cognitive domains from C1. Remembering, C2. Understanding, C3. Applying, C4. Analyzing, and C5. Evaluating.

- 2) Students' Scientific Argumentation skill

Scientific Argumentation skill in this research is the skill to construct a set of statement to make a claim. Scientific argumentationspecifically is being able to develop andanalyze scientific claims, supporting the claim with evidence from investigations of the naturalworld, and explaining and evaluating the reasoning of an idea (Freyet al., 2015).Students' scientific argumentation skill, in this research is analyzed based on Toulmin's argument pattern, and the argumentation level based on Erduran et al., (2014) which consist of five level.

- 3) The concept used in this research is global warming. The concept is included on the National Curriculum of Indonesia in 2013, that limited by basic competency on VII grade science. Basic competence number 3.10, with the sub topics are the effect, cause, and solution of global warming.

1.5 Research Objective

This research objective is specified as follow:

- 1) To investigate the profile of students' concept mastery in learning global warming.
- 2) To investigate the profile of students' scientific argumentation skill in learning global warming.
- 3) To investigate the correlationbetween students' oral and written scientific argumentation in learning global warming.
- 4) To investigate the correlation between students' scientific argumentation skill and concept mastery in learning global warming.
- 5) To investigate students' perspective towards their scientific argumentation skill.

1.6 Research Benefit

The result of this research is expected to give a good input to as follow:

- 1) For Teachers

This research is expected to become a reference and description regarding students' concept mastery and scientific argumentation skill in designing a learning, or develop an instructional method that proven can improve

students' skill. Moreover, this research provides correlation between concept mastery and argumentation, that can be used for teacher as consideration to apply the teaching learning activity.

2) For Students

This research gives students' description about their current condition of concept mastery and scientific argumentation skill both in oral and written. Therefore, the follow up for better improvement quality of concept mastery and scientific argumentation skill can be determined.

3) For Researchers

This research gives a clearer description about the students' concept mastery and argumentation skill, both in oral and written argumentation and the correlation with the concept mastery of the students.

4) For Other Researchers

As input and reference to describe the natural condition of students argumentation skill for both oral and written argumentation and the students' concept mastery. The informations which are appeared through this research could be evaluated as the way to have better ideas for the future impactful research regarding the concept mastery and scientific argumentation skill. Hopefully, in the future, more researchers are conducted more complex idea and current problems that give valuable influences for better educational improvement.

1.7 Research Paper Organization Structure

This paper is arranged based on these following structure:

1) Chapter I: Introduction

This chapter contains background of the study, research problem, research question, limitation of the problem, objective of the research, and research benefit.

2) Chapter II: Concept Mastery, Scientific Argumentation

Skill and Global Warming

This chapter contains theory and literature explanations, the research variables.

In present study, the literature review contains the explanation about

concept mastery in cognitive aspects, scientific argumentation and Global Warming as science topic.

3) Chapter III: Research Methodology

This chapter explains the research methodology, data gathering, research instruments, and the research procedure.

4) Chapter IV: Result and Discussion

This chapter contains data analysis, interpretation, and also discussion of the findings.

5) Chapter V: Conclusion and Recommendation

As the last Chapter, All research questions are concluded based on the findings. The suggestion regarding the difficulties and obstacles are presented on present study.