CHAPTER I
INTRODUCTION

A. Background

In this era, students are challenged with heaps of very much increasing information, concurrently human experiences and knowledge which are enormously flourishing. Considering diverse resources of information, selecting suitable materials amongst abundant sources is a difficult task for the student. Those challenges require high levels of intellectual and rational skills such as reflection, argument, understanding and evaluation, all of which are essential components of critical thinking (Nezami, Asgari, and Dinarvand, 2013). Being focus on critical thinking, Paul (1993) also believed that acquisition of critical thinking skills is considered vital for students to face a multitude of challenges of adult life and function effectively in today's increasingly complex world. Therefore, it is necessary for critical thinking to be formed in individuals.

Educators have long been aware of the importance of critical thinking skill as an outcome of students learning activity. The current issue about critical thinking is also being manifested in the National Education System in Indonesia. As stated in several standard competences, student are expected to: (1) build and apply the information or knowledge logically, critically, creatively, and innovatively, (2) show the ability to think logically, critically, creatively, and innovatively in making decision, (3) show the ability to analyze and solve the complex problem (Regulation of the Indonesia Minister of National Education, 2006). Curriculum 2013 also currently being implemented by emphasizing students thinking skill through students centered learning, and scientific approach.

In corresponds to the importance of critical thinking skill, researchers and educators have been working to increase demand of critical thinker by designing instructional program that focus on the acquisition and transfer of critical thinking skills (Halpern, 1998). Many studies have been done in order

to find out the way and test the effectiveness of their findings to be implemented on the lower up to higher education program.

In one side, we realize that the development of critical thinking skill is often listed as the most important reason for formal education because the ability to think critically is essential for success in the contemporary world where the rate at which new knowledge created is rapidly accelerating. However, it is also important to realize that the development of critical thinking is not only focus on how it is developed and implemented during the learning process. It must also be supported by a testing process. According to Jacob and Chase (1992), critical thinking must be supported by evaluations or tests that reflect critical thinking, because the evaluation or testing is an integral part of learning. In another supported side, it is also known that the developments of learning and teaching process cannot be separated and highly depend on teacher and students' measured critical thinking skills (Gedik, 2013). In this sense, great responsibilities fall to the researcher in order to measure or evaluate students' critical thinking as the object for those development.

Based on the importance of measuring critical thinking skill asserted on the theories above, this present study arises "Profiling" as the main focus. In academic perspectives, applying profiles is the process of identifying and representing a specific subject or to identify a subject as a member of a specific group or category and taking some form of decision based on this identification and representation (Ferraris, 2013). Hence, profiling secondary students' critical thinking skill is expected to be a best way in figuring out the current condition of student's critical thinking skill in science. With current description and specific respondents, the stakeholders or educators in Indonesia can take an actual and on target actions for having a solution or generating critical thinking developments.

Most of the conducted study in profiling critical thinking of the students were concerned on the disposition and targeted on higher educational system

(Gezer, Kantek, and Ozturk, 2010; Ghadi, et al., 2012; Incikabi, Tuna, & Biber, 2013). Different with those studies, this research targets lower secondary students as the sample and focuses on describing students' critical thinking skill based on Inch (2006), which embodies the most fundamental interconnected functions of generates purpose, raises question at issue, makes assumption, embodies a point of view, uses information, utilizes concepts, makes interpretation and inference, and generates implication and consequences. Those eight elements stands as the element of thought or the basic building blocks of thinking which are present whenever reasoning takes places (Paul and Elder, 2008).

Associating critical thinking skill description with some different aspects of student's life generates more detail description. As according to Wal (1999), measuring critical thinking of the students can be conducted on two main approaches, which are by assessing critical thinking in relation to other relevant academic skills, and even by assessing critical thinking skill as a trait or individual feature of learner. Based on those consideration, gender, previous academic achievement, and also cognitive development level are served to be discussion variables for obtaining specific critical thinking description in present study. In another words, besides correlating critical thinking skill with those variables, this research also presents the description about critical thinking level on two different genders groups, three academic achievement level groups and three cognitive development level groups. Those aspect makes the different with the other studies which mostly only provided the correlation between critical thinking skill with those variables in general (Mitrevski, and Zajkov, 2012; Ghadi, et al.,2012 ; Sharma, 2013; Incikabi, Tuna, & Biber, 2013).

As have been stated on the paragraph above, this present study raised gender as one of the natural individual feature of learner to be considered. Boys and girls spend a lot of time together in school during their formal education. Gender differences in science have been discussed for years, but

only relatively less information is available regarding critical thinking and gender. As the reason behind it, Arends (2008) explained that there are differences of cognitive ability between male and female. The differences between the males and the females are also visible on the secondary nature, emotional, and activity of psychological function (Rasiman, 2015). Based on that statement, this study tried to investigate whether those general and natural characteristics of both genders are contribute to the critical thinking skill difference between male and female students or not.

In addition, critical thinking skill have been concerned as one of the important features in education nowadays. As one of the important output, students' achievement represents the level of knowledge and skills which students gained in academic studies, and critical thinking is identified as one of the effecting environmental factor (Karagöl, & Bekmezci, 2015). On the other hand, Norris and Ennis (1989) provided a construction of critical thinking on logical thinking by indicating that critical thinking is a decision making process that requires logical and reflective thinking on what to do or what to believe. In sense of that, this present study try to examine the correlation between students' critical thinking skills with student's academic achievement and cognitive development level. Thus, the effecting and effected variables of critical thinking skill can be identified.

Discussing about the instrument for obtaining critical thinking skill profile, another problem arises due to the limitation of paper based test that commonly used in measuring thinking ability. It does not provide an opportunity to measure complex form of information, knowledge and thinking that is not possible to be engaged and assessed through traditional methods (Bodmann and Robinson, 2004). In corresponds to that, there have been a number of research focusing on the development due to the advantages of automated examination systems and electronic learning information systems over traditional paper-and-pencil or paper-based tests. The link between observation and interpretation through computer based technologies makes it

possible to score and interpret multiple aspects of student performance on a wide range of tasks chosen for cognitive features and compare the results against profiles that have interpretive value (Pellegrino, Chudowsky, and Glaser, 2001). According to Conole and Warburton (2005): "Computer based test items are written to test particular levels of ability they have the potential to deliver more accurate and reliable results than traditional tests".

In addition, the inclusion of ICTs in education also requires to re-consider and rethink, modify or change the traditional examination methods. Jamal, Tariq, and Shami (2012) asserted that electronic assessment tools had reduced the burden of teachers and facilitate to conduct examinations purposefully. They also argued that computer-based examinations can be used to promote more effective learning by testing a range of skills, knowledge and understanding. Thus, bringing critical thinking and digital technologies may be beneficial in providing an additional opportunity for interested students to achieve higher level of knowing and/or to practice the process of critical thinking skill (Charmichael et al., 1998). In corresponds to that, this present study try to describe the profile of students' critical thinking skill that is measured by standardized Science Virtual Test which is still rarely used.

B. Research Problem

According to the outlined background above, the research problem of this study is "How is the profile of secondary students' critical thinking skill on living things and environmental sustainability theme?"

C. Research Questions

In line with the research problem above, the detail research questions of this study are:

1. How is the level of students' critical thinking skill on living things and environmental sustainability theme for each Inch' critical thinking element and overall?

2. How is the level of students' critical thinking skill on living things characteristic, biodiversity, energy resources, ecosystem, environmental pollution, and global warming topics?
3. Is there any significant difference of students' critical thinking skill among female and male group?
4. Is there any significant difference of students' critical thinking skill among low, middle, and high academic achiever group?
5. How is the correlation between critical thinking and students' academic achievement?
6. Is there any significant difference of students' critical thinking skill among concrete, transitional, and formal reasoning level group?
7. How is the correlation between critical thinking and logical thinking skill?

D. Limitation of Problem

In order to make the research become more focused, the problem is limited as follows:

1. The critical thinking used in this study is adopted from Inch et al (2006) which stated that critical thinking embodies interconnected functions of generates purpose, raises question at issue, makes assumption, embodies a point of view, uses information, utilizes concepts, makes interpretation and inference, and generates implication and consequences.
2. The theme used in this study is living things and environmental sustainability that limited by Indonesian 2013 Curriculum's basic competency on VII grade science, Basic Competence number 3.2, 3.6, 3.8, 3.9, and 3.10, with the topics are living things characteristic, biodiversity, energy resources, ecosystem, environmental pollution, and global warming.

E. Research Objectives

In line with the research question, the objective of this study are:

1. To investigate the level of students' critical thinking skill on living things and environmental sustainability theme for each Inch' critical thinking element and overall.
2. To investigate the level of students' critical thinking skill on living things characteristic, biodiversity, energy resources, ecosystem, environmental pollution, and global warming topics.
3. To examine the difference of students' critical thinking skill among male and female students.
4. To examine the difference of students' critical thinking skill among low, middle, and high academic achiever group.
5. To investigate the correlation between critical thinking and students' academic achievement
6. To examine the difference of students' critical thinking skill among concrete, transitional, and formal reasoning level group.
7. To investigate the correlation between critical thinking and logical thinking skill.

F. Significance of Research

The result of this study are expected to provide the following benefits;

1. Theoretical Benefits

   The research develops the knowledge treasure in the term of current status description of students' critical thinking that focus on Inch critical thinking elements included generates purpose, raises question at issue, makes assumption, embodies a point of view, uses information, utilizes concepts, makes interpretation and inference, and generates implication and consequences. In addition, it also involved in the development of critical thinking correlational studies' knowledge treasure.

2. Practical Benefits

a) Student

The Lower Secondary School student' current status of critical thinking is measured and described. Therefore, the follow up for better improvement can be determined and adjusted.

b) Teacher

The description about Junior High School students' critical thinking current status can be a basic information for the teacher to implement, or develop an instructional program that scientifically proven can improve student' critical thinking skill. Furthermore, by considering the correlation between critical thinking and other variable in this research, teachers are motivated to enhance the students' critical thinking skill for better academic performance through appropriate supporting efforts.

G. Organization Structure of Research Paper

This paper is arranged based on these following structures:

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 significances.

2. Chapter II: Literature Review

   As the second chapter, this chapter contains the theory and literature explanation the research variables. In present study, the literature review contains the explanation about critical thinking, the science topics embodied on the research theme, critical thinking and gender, critical thinking and student achievement, and the last is critical thinking and logical thinking skill.

3. Chapter III: Methodology

   This chapter explain the research methodology, data gathering, research instruments, and the research plot.

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 the research questions are concluded based on the findings. The suggestion regarding the difficulties and obstacles of the present study.