

CHAPTER I

INTRODUCTION

A. Background

Nowadays, people in many countries believe that the key for unlocking the society's economic and creative potential is by improving and maintaining a high-quality offering of education. Throughout history, many diversified goal of education is set for honing the student's needs and reflecting a better and more relevant education. For instance, the push for 21st century skills continuously launched (Kaufman, 2013). The 21st century skills are seen to be skills that students need for being successful. People believe that those skills are revolutionary skills that demand a new and different ability. But in fact, those skills which students needed is not a new. Problem solving and critical thinking, as the example, which have been the components of human progress throughout history from the development of early tools, agricultural advancement, information literacy, to the global awareness (Rotherham & Willingham, 2010). Thus, 21st century skills show up as worthy challenge skills.

The ability to think critically appear as one of student's competence that is encouraged by government on 2013 national curriculum. This ability is expected to be actualized in educational setting such as in science learning. The vice minister of education (2014) explained on the concept and implementation of 2013 curriculum that for years, science contents tend to be memorized and not too deep. The 2013 curriculum has goal to make the science contents are focused to enrich student's knowledge which in accordance with student's need to think critically (Kemendikbud, 2014). Butler (2012) initiated that critical thinking has different construct with intelligent or cognitive ability, but the relationship between the two is modest at best. Both cognitive competencies and personal competencies include in critical thinking. Those competencies will interact and involve each other (Fahim & Pezeshki, 2012).

According to Inch et al. (2006), critical thinking is a process which requires a person to think rationally and also judgment for answering questions that cannot

be easily answered. To think critically about an issue, someone will be directed by instruments such as relevant arguments, fact, and reasons that promote good decision making.

Throughout years, researchers argue about the factors which influence the students' critical thinking. Ghazivakili et al. (2014) indicate that critical thinking, learning style, and academic performance are associated each other which supported with other researchers that focus on the relationship between critical thinking and academic achievement. Salahshoor and Rafiee (2016) revealed that boys and girls are not significantly differed in using critical thinking skill. While, Fahim and Hajimaghsoodi (2014) elucidated that motivation and critical thinking have been recognized as the crucial elements of learning. Most research regarding the critical thinking and factors that influence it use university students as the subject of the research (Hunter et al, 2014; Azizi-Fini et al, 2015). Beside that the number of research which focus on the relationship between students' critical thinking and learning styles or students' motivation to learn science is still rare to find (Ghazivakili et al., 2014; Nosrantina & Soleimannejad, 2016) . Gender also still become an upcoming issue that researched related to critical thinking skills especially on how male and female groups use those skills (Hunter et al, 2014; Nikou and Economide, 2015; Oguz and Atasaven, 2016). Researcher intend to view the critical thinking on this point of view.

As the skill that urgently needed, the importance of measuring critical thinking skills cannot be overemphasized. Therefore, the profiling as the main focus is this present study arise. Although, most of students profiling is done in higher education level (Hunter et al, 2014; Azizi-Fini et al, 2015). Differently, this study use junior high school students as the target of profiling.

The profile of students' critical thinking is based on critical thinking which developed by Inch et al (2006) that focus on generates purpose, raises question at issue, embodies point of view, makes assumption, uses information, utilizes concepts, makes interpretation and inference, and generates implication and consequences. Those elements are the building blocks whenever reasoning take place (Paul and Elder, 2012).

Discussing about assessment, Stobaugh (2013) stated to make critical thinking skills infused to assessment, it needs interpretive materials. Interpretive materials require students to utilize their higher-level thinking skills. The use of such exercises in class prepares students for state and national assessments, which already embed interpretive materials into their assessments. The challenge of creating high-level task and assessment can be faced by providing graphics, scenarios, and quotes and also videos to the assessment. Meanwhile, most critical thinking assessments are not externally validated against measures that reflect how adults think in real-world situations. Most researchers use academic achievement and aptitude measures (e.g. grades, standardized test scores), or measures of cognitive abilities (e.g. fluid intelligence, tests of reasoning) to establish the validity of their instruments (Butler, 2012).

The presence of new technologies that involve computerized testing has started to be widespread and implemented in large scale testing (Hosseini et al., 2014). Professional groups and promotional examinations in various stages started to use computer based test (CBT) for entrance examination in education, military training, and certification examinations (Abubakar & Adebayo, 2014). Which seems that the use of CBT cannot be overemphasized.

As developed in Indonesia, CBT National examination began to be implemented in 2014. It conducted in certain school such as Indonesia-Singapore Junior High School and Indonesia-Kuala Lumpur Junior High School. Both schools show quite encouraging result which drive the government to improve students' literacy on information, communication, and technologies (ICT). Gradually, the number of school that implement this CBT National Exam are grown year by year. On 2016, Ministry of Education and Culture listed that the number of school that implement CBT National Exam increase to 948 junior high school. It shows the number of school that implement CBT National Exam increase for more than 90% than the previous year. On 2017, the number of school which use CBT Exam reach 11096 schools. It also decreases the testing time up to 30 minutes which perform the effectiveness of CBT National Exam

that in line with the research result that CBT can reduce testing time (Chua, 2012; Reid, Robinson, & Lewis, 2016).

Some recent studies have been conducted to evaluate the effectiveness of CBT by comparing it with paper–pencil testing (Chua, 2012). Computer-based testing appear as the current issue to assess students. It emerged as an innovative test which most pursued by many states. CBT show up as the answer to have cheaper and speedier test delivery for state and district-wide assessments (Thurlow et al., 2010).

The theme of living things and environmental sustainability is one of science theme that is learned since elementary school. Students learn living things from the topic of what is the living things itself and how its interaction with environment. On 7th grade the theme focus on the living things, biotic and abiotic components, environment, and energy. On the 8th grade the theme focus on the structure of the living things mainly on plants and the technology which inspired by it. While on the 9th grade the focus is on the environmental sustainability. About how ecological sustainability as the connection between human needs and ecosystem service will meeting the human needs without compromising the health of ecosystem where human activities take place (Callicot & Mumford, 1997).

This present study introduce the science virtual test as an interactive and attractive computer based test to assess critical thinking in such interesting way. Hence the profile of this study is measured through Science Virtual Test in Living Things and Environmental Sustainability Theme for 9th Grade which constructed based on Inch critical thinking elements. To make the critical thinking profile description more distinctive, the students' critical thinking profile also will be viewed based on the factors that considered to influence critical thinking, i.e. gender, learning style, and learning motivation.

B. Research Problem

According to the background above, the research problem of this study is “How is the profile of students' critical thinking measured through science virtual test on 9th grade in the theme of living thing and environmental sustainability?”

C. Research Question

Elaborating the research problem, the research attempts to explore the following question:

1. How is the level of students' critical thinking measured through science virtual test on 9th grade in the theme of living things and environmental sustainability for overall and each critical thinking element?
2. Is there any significant difference of students' critical thinking measured through science virtual test on 9th grade in the theme of living things and environmental sustainability between male and female group?
3. Is there any significant difference of students' critical thinking measured through science virtual test on 9th grade in the theme of living things and environmental sustainability among visual, aural, read/write, and kinesthetic group?
4. Is there any significant difference of students' critical thinking measured through science virtual test on 9th grade in the theme of living things and environmental sustainability among low, moderate, and high motivation group?
5. How is the correlation between students' critical thinking measured through science virtual test on 9th grade in the theme of living things and environmental sustainability and students' motivation to learn science?

D. Limitation of Problem

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

1. Critical thinking that used in science virtual test is developed according to Inch's critical thinking which involves eight elements that adapted from Paul and Elder which include question at issue, purpose, information, assumption, point of view, concepts, interpretation and inference, and implication and consequence (Inch et al., 2006).

2. Theme that used in science virtual test is living things and sustainability theme which focus for 9th grade that limited by core competence number 3 on basic competence 3.5, 3.6, and 3.10 which attached on 2013 National Curriculum.
3. Gender is differentiated into male and female group who enrolled in 9th Grade Junior High School.
4. Learning style that used to determine students' learning preferences is visual, aural, read/write, and kinesthetic (VARK) learning style (Fleming, 1992).
5. Students' motivation to learn science that determined by Glynn and Koballa (2006) has five domains: intrinsic motivation, grade motivation, career motivation, self-determination, and self-efficacy.
6. Number of students which involved on this research is limited to 110 of 9th grade students as representative from three public school.

E. Research Objective

This research objective are specified as follow:

1. To investigate the level of students' critical thinking measured through science virtual test on 9th grade in the theme of living things and environmental sustainability for overall and each critical thinking elements.
2. To examine the difference of students' critical thinking measured through science virtual test on 9th grade in the theme of living things and environmental sustainability between female and male group.
3. To investigate the difference of students' critical thinking measured through science virtual test on 9th grade in the theme of living things and environmental sustainability among visual, aural, read/write, and kinesthetic group.
4. To investigate the difference of students' critical thinking measured through science virtual test on 9th grade in the theme of living things and environmental sustainability among low, moderate, high motivation group.
5. To investigate the correlation between students' critical thinking measured through science virtual test on 9th grade in the theme of living things and environmental sustainability and students' motivation to learn science.

F. Research Benefits

The results of this study are expected to provide the following benefit:

1. For teacher, students' critical thinking profile especially in learning science can be used by teacher as the basis to produce test item that engage students' critical thinking. A productive and high quality test item can be developed as the instrument for measuring critical thinking skills.
2. For students, students' critical thinking profile can increase students' motivation in learning science especially in critical thinking as one of the skills that very needed in both 21st century skills and 2013 curriculum. Student will accustomed with the test items that involve critical thinking skills. This also can train them to face another critical thinking test in enjoyable and sophisticated way.
3. For another researcher, another researcher can use this research as based research to develop science virtual test not only to see the relationship between learning styles and students' performance but also in another aspects. This also can develop by other researcher to make a research in critical thinking in learning. This can be a reference for a related research.

G. Organization Structure of Research Paper

This paper is constructed with several chapters. The chapters consist of chapter I to chapter V. Chapter I is introduction. It this chapter contains background of the study, research problem, research question, limitation of the problem, objective of the research, and research significance. Chapter II is literature review. This chapter contains the theory and the literature explanation of the research variable. In this present study, literature review contains of students' critical thinking, the science topic on the research, critical thinking and gender, critical thinking and learning style, and critical thinking and students' motivation. Chapter III is research methodology. This chapter explains the research methodology, data gathering, research instrument, and research plot. Chapter IV is result and discussion. This chapter contains the result and discussion of the study. The last chapter is chapter V. This chapter contains conclusion and

recommendation of the research. In this chapter, all research questions are concluded based on the findings. The suggestion regarding this present study.