

CHAPTER I

INTRODUCTION

A. Background

In the process of learning, mastering the skill on how to do science is as important as mastering the cognitive comprehension. Science as it is relying on facts and evidence through scientific investigation allowed the students to explore their inquiries through some ways to the point they can master the skills to do science. Scientific inquiry skills are important as it is used as an indicator of students ability in conducting scientific inquiry as well as students' understanding in instructional learning process. There are various definitions regarding to Scientific Inquiry Skills (SIS). According to National Education Standard in Wenning (2007), scientific inquiry can be referred as diverse ways to learn natural phenomena and suggest an explanation based on the evidence found. Scientific inquiry as in terms of American Association for the Advancement of Science (AAAS) in Wenning (2007) can be described as a complex way in conducting such observation or scientific method flexibly.

Due to the existence of pressure in increasing the children's score on standardized examination, such as National Examination, has caused the teaching learning process to be overwhelmingly dominated by literacy instruction regardless on teaching the students the science instruction, especially triggering them on how to be a scientist (Howes, Lim, & Campos, 2008). During the process, the students are emphasized on the mastery of content knowledge, which includes memorizing terms and procedures, and place an excellent performance on high-stakes standardized assessment tests (Stigler & Hielbert, 1999 in Gautreau & Binns, 2012). The learning process such this enforces Indonesian school to focus more on cognitive domain and less engaging the students on the

skills achievement. This statement drawn based on personal experience of the researcher doing several observations in several state junior high schools which the learning objectives and activities tent to achieve cognitive aspect and very little of affective, psychomotor, or scientific inquiry skills achievement.

Researchers showed that Indonesian's human resources quality is still low compared to other country around the world. One of the reasons explaining the low quality of human resources is due to low quality of education, as it is stated that the quality of country's development is measured based on what it is mirrored by its education quality (Wardono & Mariani, 2014). This statement is proven by the result of Indonesia's rank in Program for International Student Assessment (PISA) 2012, which based on the result Indonesia is ranked on position 62, with mean scores in mathematics, reading, and science are all below average. Another result from Trends in International Mathematics and Science Study (TIMSS) as in Science Field in 2011 showed that the result of science achievement of Indonesian students is still below the TIMSS' scale center point (Martin *et.al*, 2011).

Inquiry based learning has been widely promoted in science education (Levy, *et. al*, 2013). Many international journals have been examined inquiry as well as how it relates with instruction process at class. Among all inquiry-based learning, levels of inquiry were proposed by American experts who provide an inquiry-based learning along with a framework of learning sequence. *Levels of Inquiry* also supports some inquiry skill which provided differently in every level. Levels of inquiry provides a hierarchy for teacher to teach for inquiry – a process how to assist the students to develop some inquiry skills (Howes, *et. al*, 2008), which also supported by *Badan Standar Nasional Pendidikan* (BSNP) for 2013 as it was stated in *Permendikbud Nomor 65 tahun 2013*. The skills that are

aimed to be achieved by students are included into the scientific inquiry skills essences.

There have been several similar researches in regards to levels of inquiry and how it affects to students achievement. One of them is made by Hidayat in 2013 which investigate the profile of students' inquiry ability after implementing inquiry-based learning using levels of inquiry. Another research related to the effect of levels of inquiry implementation on students' achievement was made by Pratiwi (2014) entitled "*The implementation of levels of inquiry in improving junior high school students' achievement in optic*". The other research made by Wijaya in 2014 entitled "*The implementation of levels of inquiry in improving students' achievement in earth science topic*". Based on the three researches, three of them was resulting a conclusion that levels of inquiry does contributes in medium and high level on students' achievement proved by size-effect normalized gain. Yet, those researches were stressed on cognitive comprehension and yet there was no similar research in investigating the effect of levels of inquiry on students scientific inquiry skills' achievement.

Descriptive-quantitative data analysis is used in explaining result of the research. Through this research, it is expected to see whether *Levels of Inquiry* method implementation may affect to achievement of students' scientific inquiry skills, especially in certain stages which is focused to be conquered by lower secondary students.

B. Identification of Problem

Teaching through inquiry has become one of fundamental requirement in developing scientific thinking skills, especially in science education (Koksal & Berberoglu, 2014). Even Indonesia Ministry of Education has stated in *Permendikbud Nomor 65 tahun 2013* that it is required to implement inquiry

based learning in obtaining certain fundamental skills to be mastered by students. Wenning in 2004 proposed an inquiry method called Levels of Inquiry which is assumed can improve the inquiry skills needed by students through its scaffolding teaching method (Wenning, 2007). Wenning also stated on the same paper that in order to drill scientific inquiry skills systematically and appropriate to students' intellectual maturity, a framework is expected to be provided. The researcher is triggered in finding out the effect of Levels of Inquiry on students' science inquiry skills achievement.

Inquiry-based learning has been widely promoted to be implemented in class activity, especially in science class including biology class. Biology is indeed having tendency to be learned through memorizing the facts and being taught through traditional teaching method. Yet, inquiry-based learning, as in this terms levels of inquiry, will enable to support the natural interest in science, make a hypothesis, etc (Prokop *et.al.*, 2007) Even though there were several preliminary studies about how levels of inquiry affected students achievement and all of them are in physics topics, yet there has not been any research which investigate the effect of levels of inquiry to the improvement of students' scientific inquiry achievement whereas scientific inquiry skills are embodied in every levels of inquiry. Thus, the research is entitled "*Effect of Levels of Inquiry Implementation on seventh Grade Students' Scientific Inquiry Skill Achievement on Plant Classification*".

C. Research Problem and Questions

Based on the explanation above, the research problem of this research will be highlighted on "How is the effect of levels of inquiry method implementation on students' scientific inquiry skills achievement?"

A broad research question guided the design and analysis in this research. These are listed as below:

1. How does *Levels of Inquiry* method implementation affect students' scientific inquiry skills achievement?
2. Which of scientific inquiry skills tended to be mastered by students after the implementation of *Levels of Inquiry*?
3. How is the feasibility of levels of inquiry in drilling students' scientific inquiry skills?

D. Limitation of Problem

1. The Levels of Inquiry Method which is implemented will be referred to the Levels of Inquiry Spectrum as it is written in Wenning (2004), which will be limited starting from discovery learning until inquiry lab.
2. Scientific Inquiry Skills will be referred to scientific inquiry skills stages (Wenning , 2007), which are identify a problem to be investigated, Using induction, formulate a hypothesis or model incorporating logic and evidence, Using deduction, generate a prediction from the hypothesis or model, Design experimental procedures to test the prediction, Conduct a scientific experiment, observation, or stimulation to test the hypothesis or model, and Explain any unexpected results.
3. The effect of levels of inquiry implementation will be limited to statistical calculation and analysis result, such as the comparison of mean between pretest and posttest, score of average normalized gain, and significance gotten from one simple independent t-test score.

E. Research Objectives

The research entitled “Effect of *Levels of Inquiry* Implementation on seventh Grade Students’ Scientific Inquiry Skill Achievement on Plant Classification” is aimed to obtain several objectives, such as:

1. To identify the relationship of levels inquiry and science inquiry skills and whether levels of inquiry method affects the improvement of students’ scientific inquiry skills achievement.
2. To identify the profile of which scientific inquiry skills that is mastered the most by students.
3. To determine the feasibility in facilitating learning process to drill students’ scientific inquiry skills through levels of inquiry method of teaching.

F. Research Benefits

This research as some benefits in some field, such as below:

1. Researcher

This research enable the researcher, as in this term is a prospective science teacher, to define how the best way to drill scientific inquiry skills of students during science class learning process. This research may also become one of reference in the instruction process during teaching practice when they use inquiry-based learning as the approach. This is due to the fact that this research elaborates the real focus of the relationship between inquiry-based learning, especially levels of inquiry, and the achievement of scientific inquiry skills. Besides, this research also elaborates how the best sequence to use inquiry-oriented science teaching in school, due to the hierarchy of inquiry in the learning spectrum.

2. Information Database

As the continuation research regarding to levels of inquiry with different research objectives, this research can be one of references in giving insight about the inquiry implementation and how its effect on students' skill achievement. It is not only scoped to become information database for future researcher who interested in levels of inquiry, but also to all of researcher who interested in inquiry-based learning implementation. This study may become one of pilot project in developing the framework of how inquiry based learning should be taught in order to improve scientific inquiry skills since there were only few researches which investigate about the effect of levels of inquiry implementation on students' scientific inquiry skills' achievement. Other development and concern studies may emerge due to this study

G. Organization Structure of Research Paper

Chapter one tells about the background and identification of problems which become basic this research paper. Based on the reasons explained in the background as well as the problems identified, the focus of research paper is focused on two big research questions which will affect the treatment used in methodology. Chapter one also includes the explanation of research objectives and benefits for students, teacher, and other researcher.

Chapter two tells about the theories related which become the basic explanation that can help in explaining the result of research. Chapter two will be divided into four different part which each part will explain inquiry-based learning, levels of inquiry proposed by Wenning (2004), science inquiry skills proposed by Wenning (2007), and theory of plant classification.

Chapter three tells about the methodology used during research. In this chapter three, the explanation of methodology will include the technique used in

sampling, research design, explanation of operational definition, and instruments used in data collection.

Chapter four tells about the result gained after implementing the research based on the research designed previously in chapter three. The result will be explained descriptively accompanied by graphs and figures. Chapter four will also includes the discussion of the result related with theories related that is underlying it.

Chapter five tells about the conclusion and recommendation given for readers and future researchers in order to be able to conduct the future research better.