CHAPTER I
INTRODUCTION

1.1   Background

Curriculum 2013 is one of the education systems in Indonesia that is currently being used. According to *Kementerian Pendidikan dan Kebudayaan* [Ministry of Education and Culture], this *Kurikulum* 2013 [Curriculum 2013] is one of the most effective teaching models as it can fulfill and address the mental, physical and also academic aspect of the students (Kementerian Pendidikan dan Kebudayaan, 2014). Indonesia is now making significant policy reforms aimed at improving the education's quality. Some programs namely *Bantuan Operasional Sekolah* [School Operational Assistance] and *Indonesia Pintar* [Indonesia Smart] have been run by the government in order to greatly enhance the school income, and to ensure that the students get the best facility which can support their learning process. Unfortunately, the data showed that Indonesia is still facing some problems in term of its quality of education.

Referring to international survey conducted by Organization for Economic Co-operation and Development or OECD by using Program International for Students Assessment or PISA which conducted in 2018, Indonesia's score in science is only 396 whereas the average score of science is 489, it indicated that Indonesia's score is still below of its average (OECD PISA 2018). Sadly, from the result of PISA in 2015, Indonesia's score is even shrinking from 403 to 396. In addition, according to worldwide survey of Trends in International Mathematics and Science Study (TIMSS) in 2015, Indonesia is on rank of 45th from 48 countries which joined the survey. Indonesia gained 397 for the average score where the international average score is 600 (Martin, Mullis & Foy, 2016). Those results revealed that students' achievement in science is considered as low and the result also indicated that science subject is believed as hard to learn in Indonesia.

The fundamental purpose of the system of science education is to promote students' ability in collect some information rather than teacher transfer it in this information era. One essential objective of reformation of science education is to equip students who have an active interest in science (Putri, Rusyati, & Rochintaniawati, 2018). Science education is one of the main factors that are

important for human development. Researches on science education or science learning have become one of the most popular in the research words. One crucial part that needs to be addressed in the research is the conception of the students as a learner. There were so many researches that emphasized on students' concept understanding (Atikah, Sanjaya, & Rustaman, 2018). The research about students' concept was authorized by Ausuble (1963) as the major issue in science education. He developed the idea that students' prior knowledge is very essential for learning science (Olusegun, 2015).

Comprehending the concept is one the most crucial aspects in learning. Activities in learning cannot be excluded from concept mastery. Capability to master the subject can be seen through the concept of mastery. Concept mastery is the capacity of the students to recognize and incorporate the value of learning in their everyday lives (Ibrahim, Rochintaniawati, & Sanjaya, 2017). Concept mastery of students is an essential aspect of learning performance, especially in learning science. Concept mastery can reflect students' cognitive performance as a product of learning process. Concept mastery is an important thing that needs to be acquired by the students (Phillipson, 2011). Every student should have knowledge, ability and also competency which focus on cognitive aspect. Assessing students' concept mastery in certain science topic could bring some benefits. One of them is concept mastery can inform the teacher about what a students can accomplished after the learning process is conducted. It is also can provide an academic overview for the teacher that can be used to monitor students' cognitive growth in order to achieve the objective of learning (Furnham, Chamorro-premuzic, & Mcdougall, 2003)

Cognition is a phase of acquiring and understanding the concept through students' thinking, sense, and also experience (Anderson, Krathwohl, & Bloom, 2001). An emphasis on meaningful learning is compatible with the concept of learning as information building, wherein the students attempt to describe their experience in learning (Wardani, Widodo, & Winarno, 2017). Referring to constructivism theory, learning science requires assessing current cognitive structure of the students and to create new understanding by modification or rearranging. Therefore, unveil the students' current knowledge and understanding

will improve their cognitive structures (Valadares, 2013).

Another important point in science education that needs to be identified is the students' conception and perception as a learner. The students' perception of knowledge is consisted of "pieces", where their understanding or knowledge of a specific concept is related to another concept. These pieces of knowledge will build a structure of knowledge (Disessa & Sherin, 2013). In order to ensure successful and substantive process of learning, it will be easier for the teacher to understand how the students perceive a specific concept. If students have detailed understanding about a scientific concept as well as understand how science education is implemented, they can own a better fair judgment regarding scientific project and technology (Peters-burton & Baynard, 2013). The variety of students' perception towards a science subject can be utilized to enhance the discussion process in the class, and can be a method where the teacher delivers about the nature of science. This is essential to obtain how the students perceive the concept of science in order to set up a suitable teaching method (Darling-hammond et al., 2020).

Students' perception of a specific science concept is built from piece by piece of knowledge. The conceptual network of the students can be uncovered by the phrases or sentence structure they used to describe the conception of science. Analyzing the phrases or structure of the sentence will reflect the way the students perceive and interpret a scientific concept (Hammer, 2009). Recently, the language network analysis has been utilized in the field of education as a method to evaluate and to visualize the structure of students' perception (Brewe, Kramer, & Sawtelle, 2012).

Semantic network analysis or language network analysis is one of the methods used to grasp students' perception through written statements and to show the connection among statements. This network analysis operates through by processing of network language (Lee, Shin, & Ha, 2015). The purpose of network analysis in education is to assist teachers and educational analysts of recognizing the cognitive structure of the students and to help examine an implicit context of the thinking of the students. Semantic network analysis has function to visualize the relation between narrative statement and useful for framing students'

perceptions (Schizas, Katrana, & Stamou, 2013). One more benefit of using network analysis is the ability to understand the position of the word used and how it will be encoded inside the network (Hulst, 2009).

The main focus topic in this research is global warming. Global warming is now considered as the global concern in this 21st century era (Alexandru, Ianculescu, & Bica, 2013). The Intergovernmental Panel on Climate Change has stated that global warming is unavoidable and human activities are the main cause of it. The impact of global warming is mainly due to our local use of fossil fuels such as in heating or supplying our homes transportation as a byproduct of burning which produces carbon dioxide, and other gas containing-chemical. This issue made global warming as the global concern of 21st century (Masson-Delmotte, 2018).

Teaching students about global warming is essential for advancing well-rounded education, and for reducing a crucial atmospheric science deficiency. Global warming topic offers a common context for learning science through personal and social application (Shepardson & Niyogi, 2009). Learning about environmental problems such as global warming allows students to take responsibility for maintaining and decision making, and it is really necessary to open their perspectives on these topics (Çimer, 2011). Learning about global warming helps student to understand and examine the effect of global warming toward the environment, increases "climate literacy" among young generations, and it will motivate changes in their attitudes and behavior. By raising students' awareness, and develop content knowledge as well as skill development, education is a fundamental aspect that can work as catalyst for responding to global warming (Rosidin, 2017). To foster a sense of responsibility for the 21st century among potential qualified citizens, several countries have made understanding and mitigation of global warming as major issues in science education for primary and secondary schools (Zeidler, 2014).

As elaborated previously, this research attempt to identify the profile of students' concept mastery since concept mastery is the important thing that needs to be acquired by the students. Beside concept mastery, another essential aspect in science education that needs to be determined is the students' perception as a

learner. One method that can be used to determined students' perception is semantic network analysis. The topic in this research is global warming since it offers context for learning science from via personal and social implication for the students. Therefore, the author has decided to run a research with the title of "The Profile of Students' Concept Mastery and Students' Perception by Using Semantic Network Analysis Method in Learning Global Warming".

1.2 Research Problem

The research problem of this study is "How is the profile of students' concept mastery and students' perception by using semantic network analysis in learning global warming?'

1.3 Research Question

Detailing from the research problem, this research tries to investigate these following questions:

1) How is students' concept mastery based on the level of cognitive domain in learning global warming?

2) How is students' concept mastery based on the subtopic of global warming topic?

3) How students from the 7th to the 9th grade perceive the concept global warming topic?

4) How students of junior high school in general perceive the concept of global warming topic?

1.4 Limitation of Problem

To make this research become more detailed, the problem is limited as below:

1) Students' concept mastery

In this research, students' skill in mastering the concept is limited into six levels of cognitive domain based on Bloom's revised taxonomy (Anderson & Krathwohl, 2001) which consisted of C1 (Remembering), C2 (Understanding), C3 (Applying), C4 (Analysing), C5 (Checking) and C6 (Creating).

2) Students' perception

Students' perception can be identified as identified as students' willingness to express their conceptual experiences. Students' conception in this research is limited into students' intuitive which synchronize with normative idea (Opfer, Nehm, & Ha, 2012) in the concept of global warming topic students' intuitive idea is correlate with the normative idea.

3) Semantic network analysis

Semantic network analysis is a method that can be used to collect students' perception of a scientific concept. In this research, the semantic network analysis is limited by its elements: nodes, edges, frequency, weight, in-degree centrality and betweenes centrality (Drieger, 2013).

4) Global warming topic

The main topic in this research is global warming which is limited by core competency number 3, and basic competency number 3.9 for 7th grade students which are stated in *Kurikulum 2013*. The subtopic was also limited into 4 parts; the greenhouse effect, the cause of global warming, the effect of global warming, and human effort in reducing the global warming.

1.5 Research Objectives

Elaborating from the research questions, the objective of this research specified as listed below:

1) To investigate students' concept mastery based on the level of cognitive domain in learning global warming

2) To investigate students' concept mastery based on the subtopic of global warming

3) To investigate how students from the 7th and 9th grade perceive the concept of global warming

4) To investigate how students from junior high school in general perceive the concept of global warming

1.6 Research Benefit

The result of this research is expected to give good benefits to certain parties as listed below:

1) Teacher

   This research reveals students' concept mastery and expose how the students perceive the concept of global warming topic. The result of this research can be used by the teacher to develop and improve the teaching method which encourages the students' scientific thinking and achieve the objective of the learning.

2) Student

   This research gives the students description about their current condition of concept mastery and perception in global warming topic. And also the result of this research can be used to motivate them more in learning science.

3) Another researcher

   The result of this research is expected can be used by another researcher as a reference to conduct further research with the same scope.

1.7 The Organization of Research Paper

In order to make this research systematically structured, this research is arranged based on the arrangement explained as below:

1) Chapter I : Introduction

   This chapter consists of background of the research, research problem, research question, research objectives, research benefit and also the organization structure of the research. This chapter is the foundation of the research.

2) Chapter II : Literature Review

   This chapter elaborates more details about the theories that were used in this research. Those theories were including students' concept mastery, students' perception, semantic network analysis method, as well as global warming topic

3) Chapter III : Research Methodology

This chapter explains more about the research method and research design, subject of the research including the population and the sample, instrument that was used in conducting the research, data analysis and also procedures of the research.

4) Chapter IV: Result and Discussion

This chapter reveals the data collected as the results of the research, and also discuss the reason behind the data collected. The author analysed the data gained according to the needs of answering research questions that has been determined before conducting the research.

5) Chapter V : Conclusion and Recommendation

This chapter consists of the conclusion based on the collected data that has been executed and analysed in the previous chapter. This chapter also shows the recommendation from the author that can be used by the teachers, or another researcher who want to do the further research.