CHAPTER I INTRODUCTION

1.1 Background

Curriculum 2013 is one of Indonesia's education systems which being chosen as an education system for the time being. Based on *Kementerian Pendidikan dan Kebudayaan* (2014) curriculum 2013 is one of highly effective teaching model because this curriculum is able to accomodate and approach students' emotional, physical, and academic. In additional, they also stated that in addition to delivering instructional materials, teachers also need to be able to develop the value and skills of students, so the students not only develop in knowledge aspect, but they are also become a creative and proactive students to face an ever-changing times.

In a fact, it is not easy to achieve the purpose of curriculum 2013, especially learning in science. Based on the worlwide survey study by OECD (Organization for Economic Co-operation and Development) using PISA (Program International for Student Assessment) test as the international study of the achievements of reading, math and. The data shows Indonesia is ranked 62nd with a score of 403 from 70 countries that participated in the PISA test in 2015 while neighboring country Singapore is in the rank 1 with a score of 556. According to International survey of Trends in International Mathematics and Science Study (TIMSS) in 2015 shows that the average score of Indonesian students' science achievement is below the international average score. The data of TIMSS shows that Indonesia is ranked 45th out of 48 countries participating in this survey, the international score is 600 while Indonesia average score is 397 (Martaida, Bukit, and Ginting, 2017). From the statement, it means that learning science is still become one of the hardest subject in Indonesia.

Before the treatement done by the researcher, the researcher conduct an interview and observation with some students in the school. They were stated that physics is the most difficult subject in science. The statement also supported by Ornek, Robinson, and Haugan (2007) who states the most difficult subject in science is physics, since the students have to comprehend the science content with different representation. Different representation term means learning science mostly include the experiments, formulas and calculations, graphs, and conceptual explanation. Students in the school also claim learning in science is difficult because they have to solve the problem and mastery concept especially when it comes to physics laws. Learning environment is also influence students learning in science, they considers that the teacher only do a traditional teaching learning (passive learning).

Based on the problems found in the school, another way to reach the standard or to achieve the purpose of curriculum 2013 is students are required to have high curiosity because the context of curiosity is important at school (Aschieri and Durosini, 2015). Litman and Spielberger (2003). Kashdan et al. (2009) stated when students feel curios about something, they devote a lot of attention to an activity, process information deeper, and remember the information better. It means students with high curiosity will have a good understanding in learning, because they will find the information until they can answer it.

Knowing the problems in learning science, science and technology teaching curriculum should accordingly be developed with the implementation of learning methods, one of the primary principles of science and technology learning is teaching learners with the concept of discovery, critical thinking, questioning and problem-solving abilities (Balim, 2009). There are a lot of learning methods that can be used by the teacher in learning activity. Especially in learning science. But one of these methods that developed based on constructivits is discovery learning.

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The foundation of science teaching is to understand the natural phenomena and nature of science involve research and discovery, consists of experiments and discovery of natural phenomena (Bruner, 1996). Several studies about discovery learning were done by researchers which used it on their teaching learning process. Balim (2009) stated using discovery learning is regarded more than traditional teaching techniques to boost student achievement and inquire learning abilities. Mukherjee (2015) also found that during the exercise using discovery learning, students found themselves engaged in a fairly challenging cognitive activity, it is useful in getting students interested and curious.

In learning science, especially solar system topic, students will get theoritical content that have to be understood. The hardest part of learning solar system is not every single objetc or phenomenon in solar system could be observed directly, such as the characteristic and movement of each planet and the process of lunar and solar eclipse. To make the teaching learning process more efficient and accurately, it is better to apply technology such as simulation for solar system. Virtualization on science has a way to observe natural phenomena which, perhaps because of their location, duration and size, are impossible to direct observe (Furness, Winn, and Yu, 1997).

Solar System Scope application is one of planetarium software to see the virtualization of solar system to help the students identify or observe the solar system. By using planetarium virtual environments, students will get experience about phenomenon or a place that seems so difficult and impossible to observe directly in real life (Dede, 2000). One as interesting examples of Virtual Learning Environments, such as planetarium software, provides many innovative and useful methods to learn solar system, as the software provides learners with the structure, information and complexity of the solar system through 3D visualization (Gilbert, 2008; Mikropoulos and Natsis, 2011).

Solar System Scope application can be the technology support in discovery learning for solar system topic. Because discovery learning can be Atika Zahara, 2019 THE IMPLEMENTATION OF DISCOVERY LEARNING SUPPORTED BY SOLAR SYSTEM SCOPE

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Previously, several studies about discovery learning were done by the reserachers, Balim (2009) conduct the research about the effects of discovery learning on students' success and inquiry learning skills. Mukherjee (2015) who investigate about the effective use of discovery learning but focusing to improve understanding of factors that affect quality. Mostafae (2015) also do the research using disovery learning towards learners' speaking ability. Another research by Saab, van Joolingen, and van Hout-Wolters (2009) they investigate the relation of learners' motivation with the process of collaborative scientific discovery learning. In 1984, Andrews doing research about discovery and expository learning compared: their effects on independent and dependent students. Singer and Pease (2013) also study about discovery learning by comparing discovery learning and guided instructional strategies on motor skill learning, retention, and transfer. De Jong and Van Joolingen (1998) study about discovery learning with computer simulations but focusing on conceptual domains. And similar research conducted by Dalgarno, Kennedy, and Bennett (2014) they do the research about discovery learning using computer-based simulations to investigate on students' exploration.

There are several study about discovery learning supported by technology which is computer-based simulation. However, the differences between this research with those previous research is implementing discovery learning as learning model using Solar System Scope application as technology

support. This reserach also analyze the effect of discovey learning towards Atika Zahara, 2019

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students' curiosity which have not been studied before. Knowing about the demands of science education that the learners should increase their concept mastery and the learning process should bring the stydents to have a high curiosity, the researcher decided to conduct the reserach titled "The Implementation of Discovery Learning Supported by Solar System Scope Application to Enhance Students' Concept Mastery and Curiosity in Learning Solar System".

1.2 Research Problem

The research problem of this study is "How is discovery learning supported by Solar System Scope application to enhance students' concept mastery and curiosity in learning solar system?". Based on the research problem proposed, the research is carried out to explore the following questions:

- 1. How is discovery learning supported by Solar System Scope application to enhance students' concept mastery in learning solar system?
- 2. How is discovery learning supported by Solar System Scope application to enhance students' curiosity in learning solar system?

1.3 Limitation of Problem

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

1. Students' Concept Mastery

According to Anderson and Karthwohl (2001) students' concept mastery is measured in students' achievement on cognitive level, in this research students' concept mastery consist of C1 (Remembering), C2 (Understanding), C3 (Applying) and C4 (Analyzing) and measuring the enhancement with N-gain based on Hake's rule.

2. Students' Curiosity

There are three aspects students need to have high curisoity based on questionnaire from SCILE (Science Curiosity in Learning Environment) which are science, stretch, and embrace. In this research students' curiosity

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1.4 Research Objective

This research objective is specified as follow:

- 1. To investigate discovery learning supported by Solar System Scope application on students' concept mastery in learning solar system.
- 2. To investigate discovery learning supported by Solar System Scope application on students' curiosity in learning solar system.

1.5 Research Benefit

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

a. Teachers

Types of learning with a strong emphasis on the responsibility of the learner (discovery learning) are gaining popularity over the others forms (Swaak, De Jong, and Van, 2004). By implementing discovery learning that supported with Solar System Scope application, hopefully teacher can deliver the material of solar system in other way with easily understand, more creative, and in interesting way other than traditional teaching learning activity.

b. Students

Solar system is one of the hardest topics to be understood for students. Through the implementation of discovery learning model with supporting app which is Solar System Scope application the classroom, students will understand this concept easily and give students a new experience in learning solar system. Also through some steps that implemented based on disovery learning, students are expected to improve they curiosity so they will learn more about solar system topic.

c. Another researcher

This research hopefully can be used as a reference for further research. Other researchers can investigate the implementation of

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1.6 Research Paper Structure

This research paper consists of five chapters which include the following:

1. Chapter I

This chapter includes background, research problem, reserach objectives, research benefits, and research paper structure. Chapter one is the basic of the research which then produces discussions in this research.

2. Chapter II

Chapter two consists of the literature review of this research which explains the theory which was applied in this research. The theories which were used in this research include the discovery learning supported by Solar System Scope application, students' concept mastery, students' curiosity, solar sytem topic, and relevant reserach.

3. Chapter III

This chapter focuses on the methods which were used in this research. This chapter states the detailed information about the research design, research population and sample used, research hypothesis, research instruments, reserach procedure, and data analysis of this research.

4. Chapter IV

Chapter four concerns about the data gathered during the research, it gives detailed information on the analyzing and data processing in order to answer the proposed research questions.

5. Chapter V

Chapter five states the conclusion of this research according to the gathered data which has been analyzed and processed in the previous chapter. This chapter also consists of the recommendation from the author or researcher to the reader of this research paper which could be other researcher or teacher