

CHAPTER I

INTRODUCTION

A. Background

Globalization occurs rapidly and quickly. These developments have an impact on various aspects of human life, not least in the education aspect. In education, this development affects on learning process in the schools. According to Gagne and Briggs (1979) “Learning process as a system that aims to assist students in learning or gain information, it contains a series of events which have been designed, structured to influence and support the students' learning processes”. The learning process involves two component mutually bound to each others, the teacher as a facilitator and students as an object of the lesson. Rustaman (Sadida, 2011) stated that “Learning process is an activity between teacher-student interaction and mutual communication that takes place in educational situations to achieve learning objectives”. In order for the process of interaction goes well then it takes the media to distribute information provided by the teacher to the student. Therefore, media is including one of the most important components in learning process.

In education, globalization affects on learning process in the schools. It also affects to the technology development in the instructional media which is used in the learning process. However, nowadays still many teacher deliver the content of their learning via “chalk-and- talk” method or which is used to conventional teaching method, they do not use media appropriately whereas technologies are available for them to make change in their learning . Commonly, teacher controls the instructional process, the content is delivered in the class and the teacher tends to emphasize factual knowledge. In other words, “Teacher delivers the content and the students only listen the information from the teacher. Thus, the learning model tends students become passive in their learning process” (Orlich, 2010: 243). Kaushik and Agarwal (2012) stated that the conventional teaching method in classroom has limited effectiveness in the learning process. Some limitations which may prevail in traditional teaching method are : (1) Teaching in classroom

using chalk and talk is “one way flow” of information, (2) Teachers often continuously talk for an hour without knowing students response and feedback, (3) The material presented is only based on lecturer notes and textbooks, (4) Teaching and learning are concentrated on “plug and play” method rather than practical aspects, (5) The handwriting of the lecturer decides the objective of the subject, (6) There is insufficient interaction with students in classroom, (7) More emphasis on theory without any practical in real situation, (8) It is more about memorizing, not understanding.

Physics is one of the science subjects in middle school. Physics study about natural phenomena that occur in daily life and understand the concepts. The concept is a very important and one that should be noted how the concept was understood by learners. However, because there are many teachers who use traditional teaching or lecture so the concept is expected to be understood by students are not conveyed properly or is not working as expected. This is because a lot of physics concepts are abstract and complex, so it should be supported by practical activities. However not all school are fully equipped science laboratory facilities besides that the equipments are generally only able to show symptoms of the macro. As in optical materials with sub chapters refraction of light, refraction from air to the water can only show that the refraction of the light near from the normal line, while not able to indicate how far refraction line near from the normal line (incident and refracted angle are difficult to determine). Another problem is the efficiency of the time, doing experimental in the lab requires a long time because before doing experimental teacher must prepare the equipment moreover lack of equipments thus inhibiting activity. So, the concept cannot be reached by the students. It makes students get low achievement in physics subject.

In response to this problem, it is necessary to attempt improvement and innovation in the learning process. One innovation that can solve problems in science learning is teacher needs to make improvements their teaching strategies such as use of computer to deliver material. The other thing, teacher should place their position as a designer and organizer of learning so that students have the opportunity to understand and interpret science through learning activities. In

addition, teachers can make learning and teaching more attractive by using interactive learning media to attract students' motivation in learning science especially in physics. Hence, the role of media is important to make learning process become more life and students more curious in science subject. By choosing the appropriate media will make learning process effectively. An effective learning is a learning process that is not only focused on learner outcomes, but how effective learning process is able to provide a good understanding, intelligence, perseverance, opportunity and quality which can give change behavior and apply it in their lives.

One kind of media that developed because of the development technology is simulation. Simulations give students the opportunity to observe a real world experience and interact with it. According to Michael (Liao and Chen, 2007) simulation can afford learners numerous advantages such as simulations can (1) provide the students with the opportunity to engage in activities that may otherwise be unattainable, (2) enhance academic performance and the learning achievement levels of students, and (3) be equally as effective as real-life hands-on laboratory experiences. PhET is an interactive computer simulation for teaching and learning physics, chemistry, math, and other sciences. The simulations are animated, interactive, and game-like environments where students learn through exploration.

According to Yulianti (2012) stated that simulation can improve students' understanding on translation, interpretation and extrapolation aspect. Students can understand the concept of Expansion and they can see the abstract phenomenon become more real. Another study also state the implementation PhET simulation and simple KIT to teach psychomotor skills of students on the subject of optical can to complete psychomotor learning outcomes of students (Prihatiningtyas, 2013). And also based on research results' Prihatiningtyas (2013) by using the PhET simulation students responded was positive . Another research result state that by using PhET simulation can improve students' achievement, class that use a synergistic learning with virtual lab PhET media is

better which the posttest value is 82. When is compared with students who use learning tools that are synergistic with real lab, the posttest value is only to be 75.

Actually PhET simulation can be carried in several concepts because this media can explain abstract concept become real to the students. Because of it is abstract concept, students are more passive in learning process and it influences in their achievement. So, to make they can understand the concept it needs media that can represent the material and students become more active , then students can master the concept to be achieved in learning process. In these simulations, students can make connections between real-life phenomena and the underlying science, and seek to make the visual and conceptual models of expert physicists accessible to students. In this research, the author takes the concept of light refraction because characteristic of light refraction is one of abstract concept in physics and one of phenomenon that occur in daily life.

Due to that reason, research is needed to investigate the effect of PhET simulation on improvement of students' achievement in the concept of light refraction.

B. Research Problems

Based on the background that have been explained on above, the research problem this paper is “ How is PhET simulation can improve students' achievement in the concept of light refraction compare with conventional teaching?”

To make detailed, the research questions of this paper can be described as :

1. How PhET simulation improve students' achievement in learning concept of light refraction rather than PowerPoint Presentation?
2. How one cognitive ability that is most influenced by using PhET simulation as teaching media?
3. How are the students' response to the use of PhET simulation as media in their learning process?

C. Purposes

According to the research problems that have been described above, the purpose of this research is to:

1. To determine the effect of using PhET simulation on student's achievement in the concept of light refraction
2. To identify the cognitive ability that is most influenced by using PhET simulation
3. To identify students' response in the use of PhET simulation as media in learning process

D. Significance of Research

This research is conducted with the benefit for some parties such as :

1. Teacher

For teacher can improve their skills in using media especially in use of simulation as media in learning process. Beside that to make teacher easier to delivery abstract or complex concept in learning process. Teacher can get wider knowledge and teacher acts as facilitator. In addition it will give motivation to the teacher to be more creative.

2. Students

By using PhET simulation as media can give students more motivation in learning, so they can improve their concept about light refraction. And can give more knowledge about technology beside physics concept, students can practice to solve the problem, practicing students to take right decision in solve a problem.

E. Assumption

According to Michael (Liao, 2007:69), simulation can : (1) provide the students with the opportunity to engage in activities that may otherwise be unattainable, (2) be equally as effective as real-life hands-on laboratory experiences.

F. Hypothesis

There is three hypothesis in this study, as follow as :

1. There is a significant differences on the student's achievement in learning the concept of light refraction through PhET simulation.
2. PhET simulation is most influence on analyzing in cognitive ability of the students
3. Students feel enjoy to use PhET simulation in learning process and they easy to understand about light refraction concept