CHAPTER I

INTRODUCTION

A. Background

The Indonesian education system has to attend the needs of a large, growing, diverse and widely dispersed population as well as great disparity in enrolment rates between regions (MOEC, 2014). The 2013 curriculum has been developed to take account of the internal challenges facing Indonesia and the external and global challenges also affecting the nation and its economy. External and global challenges have created the need to ensure that education provides the best possible advantages for young people in relation to pressures on the environment, advances in technology, a need for creativity and innovation and the development of education in other modern economies.

Based on the needs and challenges which are growing in view years, the educators need to consider about the model of learning that could support Indonesia Education demands to develop human resources in Indonesia itself. Moreover in this new century, school and teachers need to drive the students for having both knowledge and skills to succeed (Buck International for Education, 2000). The global movement of 21st Century learning mandated to use ICT in teaching and learning strategically, nowadays education and technology are frequently cooperated together for the sake of improving and creating an effective education. Teachers and students in countries such as Austria, Finland, Sweden, Denmark and UK, have a generally positive attitude towards e-learning and relatively advanced IT competences (EU, 2005). In 2013 curriculum of Indonesia, the use of ICT has been integrated across subjects, thus it is inherently integrated instead of a mere standalone course. Moreover, curriculum in Indonesia have demanded more strategic use of ICT in teaching and learning: an ICT-based teaching and learning, where ICT is no longer a disregarded facilitator in teaching and learning (ICT-supported teaching and learning or ICT-enhanced teaching and learning), but an integrated component of teaching and learning in various subjects (Pannen,

2014). A survey conducted by the Centre for Information and Communication Technology in Education (PUSTEKKOM) of schools in Jakarta found the use of ICT in Indonesian schools has been part of the curriculum at all school level. However the utilization of multimedia functionality in educational field has not been well, according to preliminary observations made by Chong, Sharaf and Jacob on 2005 in the research "A study on the use of ICT in Mathematics teaching" revealed that teachers were not fully utilizing these facilities in their teaching. The frequency of their usage seemed to be limited and they do not appear to make effective use of multimedia. Some of teachers were discourage to integrate the learning process with multimedia technology because of some factors, such as the lack of pedagogical aspect, lack of adequate content, lack of technical information, lack of time, lack of training, and other factors such as access to the equipment (Hanum et al, 2013).

The lack of teacher training for using technology in classroom was taking roles on the integration of teaching and technology. Teachers need to be computer literate to become more confident and efficient ICT users. Even though majority of respondents (78.9%) have undergone at least one training session of ICT, teachers still believe themselves to have limited knowledge to fully employ and integrate multimedia software in teaching (Hanum et al, 2013). Never the less, multimedia technology has been doubtful to be employed in some learning topics and curriculum. Even though in fact ICT or multimedia technology could be good partner for teaching and learning in classrooms if its functionality and sophistication are employed effectively. Moreover, Researchers indicated that the key distinction between traditional and multimedia instructional strategy is interaction. Interactive multimedia learning cultivates interaction between the learner and the learning content and the content with the learner which support the aim of enhancing student-centered learning in classroom (Teoh and Neo, 2007).

The interaction becomes an important component in learning as it provides the students with an alternative means to have more choices when learning in

the student centred learning environment. The learning attitudes changed as the students realised that learning with multimedia elements was more flexible in exploring and constructing new knowledge. Multimedia has engaged the students and boosted their learning interest in this student-centred environment (Leow, 2014). Therefore, multimedia technologies are capable to support the needs of 21st century higher order skills.

One of 21st century high order skill which is being developed by some educational communities is collaborative problem solving skills. Collaborative problem solving (CPS) requires students to be able to establish, monitor, and maintain the shared understanding throughout the problem-solving task by responding to requests for information, sending important information to agents about tasks completed, establishing or negotiating shared meanings, verifying what each other knows, and taking actions to repair deficits in shared knowledge. Taking the beneficial of ICT toward educational field, some researchers have tried to correlate between the use of multimedia technology in the form of animation software to support collaborative problem solving skills, such as what have been done by Rosen and Foltz in 2014 about comparing students' motivation to collaborate with computer partner and human partner in the research of "Assessing Collaborative Problem Solving through Automated Technologies". The results indicated that students who collaborated with a computer agent showed significantly higher level of performance in establishing and maintaining shared understanding, monitoring progress of solving the problem, and in the quality of the feedback. However, there is no significant difference of solving problem ability between students-computer partner with one student with one computer and student-human partner, (Rosen and Foltz, 2014).

Designing an interactive animation that can measure CPS skills absolutely needs a certain problem to arose. The contextual problem which is proper for students is earthquake. Earthquake is one of the worst geological threats to the Indonesian region. The fact that the position of the Indonesian islands within

the zone of the Australian plate, the Eurasian plate, the Pacific plate, and the Philippine plate makes the country become the most seismically active country in the world (Sari et al, (2014). Learning from experience about the high risk of natural disasters and other hazards that occur in Indonesia, the information is very necessary that includes the proper ways on how to save ourselves when disasters occur and also how to avoid unnecessary accidents that occur during the earthquake (Asian Disaster Preparedness Center, 2004). Therefore, the researcher aimed to investigate the use of interactive multimedia in measuring students' collaborative problem solving as a group to have two-ways communication between students and interactive animation as well as the improvement of students' understanding in earthquake topic.

B. Research Problem

The research problem of this study is "How is students' collaborative problem solving skills and the improvement of students' understanding in learning earthquake using interactive animation?"

C. Research Questions

Specifying the research problem, this research likes to explore the questions below:

a. How does the construction of interactive animation that can measure students' collaborative problem solving skills?
b. How is the characteristic of interactive animation that can measure students' collaborative problem solving skills?
c. How is the implementation of interactive animation to measure collaborative problem solving skills based on research lesson plan?
d. How does students' collaborative problem solving skills measured by constructed interactive animation?
e. How is the improvement of students understanding after learning earthquake by using interactive animation?

D. Research Objectives

This research is expected to reach the objectives below:

1. To construct an interactive animation which is able to measure students' collaborative problem solving skills
2. To investigate students' collaborative problem solving skills using interactive animation.
3. To measure the improvement of students' understanding in learning earthquake after learning with interactive animation.

E. Research Benefit

1. Teacher

Science teacher could take the best of this research later about implementing interactive animations constructions in learning science topics. In addition, the teacher would know why interactive animation which is given to the student's important to be learning media taught in science classes. Afterwards, teachers will get inspired to develop or modify interactive animation for teaching and learning media in other relevant science topics.

2. Student

Research is not about making the students as subjects or sample of experiment but also helping them to get more skills and improve the knowledge about science and multimedia by implementing this method. By asking them to identify a problem in the beginning and finally ask the students to construct a solution as a group for that problem will stimulate collaborative problem solving skills arise. Resembles with those skills, student's understanding is expected to be improved because students are demanded to have deep analysis toward the problem if they want to have

the best solution for that. Students could get their own satisfaction without learning too much texts and concepts to understand a topic. Moreover students will get experienced for operating interactive multimedia while learning science topic and be motivated to learn science.

3. Another Researcher

This research is limited to the identification of how interactive animations construction measure students' collaborative problem solving skills and students' understanding, the other researchers are possible to complete the analysis up to the improvement of students' collaborative problem solving using interactive animation. In addition, other researchers are wished to design another animations to be involved in enhancing students' higher order skills as mandated in 21st century era.

F. Limitation of Problem

In order to make the research problem become more specific, the problems are limited as follow:

a. Interactive Animations Construction

Interactive animation construction is a form of software which is wished to be able to measure students' collaborative problem solving skills and students' understanding. There are so many applications that offer the sophistication to build interactive multimedia such as JAVA, but the researcher chose to build this interactive animation by using Flash™ application rather than other applications. The animation of this research is interactive animation cause it builds the collaborative interaction within group members when students are demanded to solve problem given by the animation where two-ways communication between the animation and students happened. Moreover, students are able to construct the animation by playing game on the media by following the instruction on animation for completing missions

arranged by the researcher which was in accordance to collaborative problem solving syntax. In addition, students are able to save their work in the form of soft file which will be saved automatically on their PC, so that the researcher could analyze the students' feedback after the process of observation in the class.

b. Student's Collaborative Problem Solving Skill

CPS in this research referred to the areas that the Organization for Economic Co-operation and Development (OECD) emphasized for major development in the Program for International Student Assessment (PISA) in addition to scientific literacy, math and reading literacy for the 2015 assessment. There are four processes of collaborative problem solving skills that are required to be done, however, this constructed interactive animation was only promoted three processes of CPS they are, 1) understanding the problem situation by interpreting initial information about the problem, 2) information is selected, organized, and integrated with prior knowledge, 3) The final process consists of monitoring steps in the plan to reach the goal state and reflecting on possible solutions and critical assumptions.

c. Students' Understanding

In this research, students' understanding is investigated through students' achievement of pre-test and post-test on four cognitive domains, those are, C1 (Remembering), C2 (Understanding), C3 (Applying) and C4 (Analyzing).

d. Earthquake Phenomenon

The content of earthquake phenomenon in this research is limited by Core Competence No.3 and Competency Standard No. 3.13 is attached in

kurikulum 2013 document with determining proper convertible material to build earthquake building resistant as the main addition knowledge.

G. Organization Structure of Research Paper.

To simplify the discussion and drafting research report, following the author plans to make the systematic and organizational framework of the research described by systematical writing as follows:

Chapter I. Introduction, including Title, Background, Research Problem, Research Questions, Limitation of Problems, Research objectives, research benefit and Organization Structure of research paper.

Chapter II. Literature Review, including description of fundamental theory of research variables. This research is reviewing Interactive Animation Construction, Collaborative Problem Solving Skills, conceptual understanding, and concept of earthquake.

Chapter III. Research Methodology, including research method, research design, population and sample which contain about, sample, location, and subject of research, operational definition, assumption, hypothesis, research instrument, research procedure and research flowchart.

Chapter IV. Result and Discussion. Including research data, data analysis, discussion of research data, and qualitative analysis of students' collaborative problem solving skill.

Chapter V. Conclusion and Recommendation, contains conclusion of research that has been conducted and recommendations for further researches.