CHAPTER I

INTRODUCTION

A. Background

It is has been widely known that many students find trouble in following learning activities at school. It is probably caused by many factors, such as level of difficulty of the subjects, learning strategy which is not precise, method of how the teacher teaches which is not suitable with the students' character, and many more. In learning activity, there are some important aspects that should be had by the students and assessed by the teacher, namely students' creativity and students' conceptual understanding. Besides the students have to master the concept learned in the school, it is necessary also for the students to be able to be creative nowadays. But, unfortunately there are not so many assignments, learning methods, and tests which are conducted by the teacher that could assess students' creativity. Most of assignments, learning methods, and tests conducted only test students' memory. Besides that, students also find it difficult to digest the knowledge because the learning activity sometimes does not support them to understand the concept better (Vahia, 2013).

Now Science is one of school's subjects which categorized as difficult lesson (Vahia, 2013), so it can be predicted that most students frequently find trouble in learning it. According to Johnston (1991) the difficulties of learning science are related to the nature of science itself and to the methods by which science is customarily taught without regard to what is known about children's learning.

Science consists of several subjects, namely biology, chemistry, and physics. As it has been explained above, science can be categorized as difficult lesson. Not only in chemistry and physics subject, students also find difficulties in learning biology concepts (Tekkaya, Ozlem, and Sungur, 2001). It has been identified that high school students face a problem in learning several concepts, such as concept of cells, organelles, organs, and physiological processes, hormonal regulation, oxygen transport, controlled experiments and the principle of structure and

function (Tekkaya, Ozlem, and Sungur, 2001). Excretion system is a concept that is included in the principles of structure and function in biology concepts.

If it is seen in a big frame, one common problem encountered by the students in the biological sciences is difficulty in understanding biological concepts. The complex concepts and vocabulary of biology classes discourage many students (Gutierrez, 2014). In learning excretory system, students are required to understand complex concepts such as human urinary system, kidney dialysis, and kidney transplants. Students also have to memorize many complex vocabularies, such as the structures of excretory organ system. So, it can be clearly concluded that excretion system is categorized as difficult concept in biology. That opinion is supported by the result of interview with biology teachers in a research conducted by Tekkaya, Ozlem, and Sungur. Based on that interview, it is concluded that some students have difficulty in learning excretory system (Tekkaya, Ozlem, and Sungur, 2001). Also according to the result of that research, excretory system was ranked ninth from thirty concepts as one of the most difficult concepts in biology. The percentage indicating the level of difficulty of excretory system in the research that perceived by students is high enough. In order to solve that problem occurs in learning excretory system, efforts should be made to reduce the total amount of factual information which students are expected to memorize, reduce the use of the passive lecture format, and devote more effort in helping students to become active, independent learners, and problem solvers (Gutierrez, 2014). Therefore, it is very important for the teacher to find out the right instructional strategies that can be implemented in learning science.

Generally, enhancing teaching and learning outcomes through relevant instructional strategies has been a major concern in educational block (Ayinde, 2014). Nowadays, there are many instructional strategies that can be implemented by educators in order to enhance students' understanding in learning science. Fasli and Michalakopoulos (2006) stated that students can learn better and retain more when they actively engage in the learning process. The key to make students' actively engage in learning process is motivation. Most motivated students will be

able to learn better, consequently progress faster, and retain more knowledge. Thus, based on those opinions, it is very important for educator to have ability to choose appropriate instructional strategy which is interesting for students, so that they can engage in learning process and learn better.

One of instructional strategies that can be used in order to engage the students in learning process is game. Even though there are still some of the principal limitations on the effectiveness of the use of game in learning activity, such as the attitude of teachers who think that games are not serious. Some teachers think that students will not take games sufficiently seriously, thus possibly dissipating student concentration on the topic being taught. But surprisingly, the fact based on research shows contrary results. In other words, the students actually become utterly absorbed in the game situations. It means that games seem to be an excellent tool of sharpening concentration (Boocock, Schild, and Coleman, 1968). That statement is also supported by Ludewig and Swan (2007) who stated that the remarkable power of games to engage our attention is evident all around us. Overall, games are actually good for learning (Rastegarpour and Marashi, 2011).

In science education, educational games have favorable characteristics to be used (Ellington et al, 1981). It is not without reason that some researchers concluded that games are good for learning science. Many researches have proved that game-based learning has positive effects on students. According to Ludewig and Swan (2007), multitudes of schoolchild have memorized names, characteristics, and rule through games. Many previous studies also have demonstrated that learning motivation and efficiency can be enhanced through educational games (Liu and Chen, 2013).

Actually, game-based learning has been applied in many science-related school subjects. But, most studies on game-based learning focuses on digital game-based learning (Liu and Chen, 2013). Although digital games can enhance learning motivation and arouse positive emotions in students, digital game has weaknesses. One of them is that it cannot provide face-to-face interaction which should be experienced by the students. According to Liu and Chen (2013), teacher-student interactions and student-student interactions exert a great impact

on learning in a classroom situation. Unlike interactions in digital games via computers, face-to-face interaction exposes people to human expressions, physical action, and verbal tones. To overcome that problem, the implementation of game-based learning which is not digital game is required nowadays. One of alternatives that offered is educational card game.

Educational card game is a game using playing cards, either traditional or game-specific (Ramboyong, 2014). Using educational card games as a medium for the implementation of game-based learning could enhance the direct interpersonal interaction between teachers and students as well as among students to a degree unmatched by the sound and audio effects of digital games (Liu and Chen, 2013). Besides that, by handling the cards and moving the character pieces themselves and competing or cooperating with peers through direct verbal communication, students can interact with one another and learn happily from within (Liu and Chen, 2013). Besides that, there is another positive effect of educational card game if it is implemented in learning process. Kirikkaya, Iseri, and Vurkaya (2010) who designed a card game of galaxies and space stated that educational card game did not only increase the learning motivation of students but also assisted them in the formation of higher conceptual abstractions. In recent years, research on learning with card games has made a substantial contribution to education field (Liu and Chen, 2013).

If we analyze the correlation between difficult subject and appropriate instructional strategy, game-based learning can be chosen as an alternative instructional strategy and educational card as one of game-based learning tools which appropriate to be conducted in learning science process. In conclusion, it is expected that educational card game can assist students in learning science concept and also enhance their capability. Since in this research the educational card game is also created by the students, it is also expected that the students can explore their creativity based on the implementation of this learning activity. Hopefully, the result of this study will demonstrate the effectiveness of card games towards students' creativity and conceptual understanding during the process of learning excretory system.

B. Research Problems

According to the background which has already stated, the problem of this research is "How is the effect of educational card game towards students' creativity and conceptual understanding in learning excretory system?"

C. Research Question

Based on the statement of problem, it can be described into several research questions as follow:

1. How is the effect of educational card game towards students' creativity in learning excretory system?
2. How is the effect of educational card game towards students' conceptual understanding in learning excretory system?
3. How is students' impression after learning excretory system using educational card game?

D. Research Objective

The research is conducted to obtain some other information and arranged as follows:

1. To investigate the effect of educational card game towards students' creativity in learning excretory system.
2. To investigate the effects of educational card game towards students' conceptual understanding in learning excretory system.
3. To investigate students' impression after learning excretory system by using educational card game.

E. Limitation of Problems

To avoid widening of problem on this research, then the research will be limited for the following things:

1. Educational card game is a game using playing cards as the primary device with which the game is played that has a purpose to help students to learn any topic in learning activity. In this research, educational card game is a group of two-dimensional cards which contain of pictures and brief information of human excretory system for learning. Specifically, the educational card game has front and back side. In front side, structured questions related to human excretory system will be displayed, while the answer of the question will be displayed in the back side of the card.
2. Creativity is a result of creative thinking. Based on Gardner (in Lih-Juan ChanLin, 2008), creativity is evident in a number of diverse learning contexts. Gardner sees that for example creativity as a cognitive process in which several intelligences are working in harmony.
3. The conceptual understanding of this study focuses on the topic of excretory system which is divided into three sub-topics, namely organ structures and functions of excretory system, human urinary system, and kidney dialysis & kidney transplants (Cambridge Secondary 1, Science Curriculum Framework). This part has an objective to measure how effective educational card game in assisting the students' thinking ability to reach the cognitive level domain.
4. Impression in this study means the students' impression towards the teaching strategy, here is game-based learning by using educational card game as the media in learning excretory system. The students' impression will be identified by using questionnaire that consists of several statements about students' impression. This questionnaire is spread only in experiment class, since control class does not use educational card game in their learning activity.
5. Excretory system is chosen as the chapter that learnt in this study. The topic focuses on human excretory system which divided into three sub-

chapters, namely organ structures and functions of excretory system; Human urinary system; and kidney dialysis & kidney transplants (Cambridge Secondary 1, Science Curriculum Framework).

F. Research Benefit

This research is important to be conducted because it is expected to provide some benefits to various sides including:

1. For students: this study expects the students who experience a learning activity using educational card game will increase their motivation to learn. Logically, when the students are motivated to learn, it is expected that the students will also increase their learning achievement. This study is expected to create a fun and joyful learning activity for the students. Through educational card game, it is expected that the students will be able to memorize science concept better and easier, so that the students can learn science without feeling distress, fear, and anxiety.
2. For teachers: this study could give a reference of a teaching device, for the teachers, especially science teachers. The teachers can use educational card game in their teaching performances as a teaching device. By using educational card game as teaching device, it is expected that the teacher can improve their quality of teaching performances in classroom's activity, especially in science class' activity.
3. For researchers: this study is expected to assist future researchers who have similar research interest, specifically about educational card game, and generally about game-based learning in science education.