

CHAPTER I

INTRODUCTION

1.1 Background

Education in Indonesia has prepared for the revolution era 4.0 industry generation, it is proven by the commitment of the government of Indonesia “Making Indonesia 4.0” (Saepudin, 2019). The implementation of “Making Indonesia 4.0”, There are two important components that must be strengthened to bring Indonesia towards the revolution of 4.0, namely education and character. By changing the education system and building educational infrastructure including educational technology infrastructure so that the world of education does not experience a technological shock in the era of the industrial revolution 4.0 (Mufarida, 2019).

In fact, science has become one of the school's subjects that are considered difficult (Vahia, 2013). Not only in the fields of chemistry and physic subject, students' also encounter in learning biology concept (Tekkaya, Ozlem, and Sungur, 2001). The students can hardly remember and understand causes by complex concept and vocabulary of biology classes (Gutierrez, 2014). Based on to Johnstone (1991) the difficulties or concern in studying of science are relevant to the method used and also the science itself. It is caused by many variables, such as the technique of teaching a teacher in a class that is suitable to the student's character or not, the teaching approach, the learning style, and many more. Learning styles are “characteristic cognitive, affective, and psychological behaviors the serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment” (Felder, 2005). The evaluation techniques are also very complicated and time-consuming, confusing the teacher and shifting the focus from paying full attention to the learners to the learners, as well as being unprepared for the teacher to apply the teaching technique in the 2013 curriculum, which causes the burden to accumulate on students so that they spend time in college and outside school.

Besides that, learning activity sometime does not encourage students' to understand the concept of learning well, so that students' become difficult to absorbing the knowledge or learning in the classroom (Vahia, 2013).

Food additives play a crucial role in today's bountiful and nutritious food supply, enabling our increasing population to enjoy variety of health, wholesome and tasty foods throughout the year (Gao, Shen, Yin, An & Jin 2011). The definition of food additive has changed over time, and is now defined as "any substance not usually consumed as a food by itself and not usually as a typical ingredient of the food, whether or not it has nutritive benefit, the intentionally added to a food for a technological (including organoleptic) purpose in the production, processing, preparation, treatment, packaging, transport or holding of such food results, or may be reasonable expected to result (directly or indirectly), in it or its by-products become part of or otherwise affect the features of such product. The term does not include contaminant or substances added to food for maintaining or improving nutritional qualities" (Carocho, Barreiro, Morales, & Ferreira 2014).

Students who are active or not in learning process begin with the appearance of students attraction and interest in the following class activities and the accomplishment of teaching and learning goals are not regarded by the satisfaction of the material purpose, but by how much students are interested in learning and understanding the material. In order to achieve this, the need for accurate techniques and hopeful learning media can assist learners to improve students' conceptual understanding and motivation. There are now a number of educational approaches that can be introduced by teachers or teachers to improve students ' conceptual understand and motivation in studying science. Fasli and Michalakopoulos (2006) He said that learners can learn better and maintain more if they are actively involved in the teaching process. Motivation is the key to making learners actively participate in the learning process. Most motivated learners will be able to learn better, make quicker progress and maintain more understanding.

On the basis of these opinions, therefore, it is very essential for educators or teachers to be able to choose the suitable educational approach that is interesting for learners so that they can participate in a teaching process and learn better.

Based on the characteristics of students in junior high school, the students Try to explore what is uncommon or find out more about an issue of concern ; not able to rest until the work is finished ; possesses a feeling of wonder and intrigue ; possesses a high amount of energy ; is adventurous and engages in spontaneous action; can uncover, investigate, question, study, evaluate, pursue and ponder (Proctor, & Burnett. 2004), they needs used the media to learn and One of the media that can be used for teaching is the game media. With games, students can learn a lot of good opportunities and activities both in and out of school. Games can create learners learn atmospheric fun, fresh, vibrant, happy, relaxed, yet still have a lively learning atmosphere. This is a general statement that some educators or teachers may challenge, but the beneficial effect of the game on learning cannot be ignored. Perhaps the best thing to say is that distinct kinds of games may be better suited to distinct teaching objectives than others, so the secret is to discover the correct educational games (Kreijins, Kirschner & Jochems, 2003: Prensky, 2001).

The use educational games can be more efficient or good strategy for food additives learning and teaching as games support an active learning environment that can enhance student motivation and engagement. “Quartet Card Game” that can be helped to counter the challenge of learning food additives at either secondary or level. Quartet card is a card games, in this game, students as a players race to collect the similarly themed cards. Players take turns alternately. In this game, the students can enhance the Cognitive, ability to learn. The purpose of using this method is to increase participant or students’ to understanding of content or concept knowledge through increasing involvement. Educational games have beneficial features to be used in science education (Ellington et al, 1981). It is not without reason that some scientists have concluded that games is great for science teaching. Many scientists have shown that game-based learning has a beneficial impact on learners. According to Ledwig and Swan (2007), a multitude of schoolchildren have memorized names, features and rules of play. Many past

Yurica Septanie, 2019

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studies have also shown that teaching motivation and effectiveness can be improved through instructional games (Liu and Chen, 2013).

Although the most card games have a good design and are also interesting, several studies have been conducted to assess the potential of games in learning compared to traditional education approaches or lecturing (Wu, J. S., & Lee, J. J. 2015). Without evidence or verification for learning, it can be difficult to justify the STEM games fit within the curriculum because a balance between the structure of the game and the need of curriculum must be achieved to avoid compromising learning outcomes or forcing the game to work in an inappropriate way (Van Eck, R 2006).

The teacher must help students' make the media as something that is academically and socially valuable. Even though student have the ability and knowledge of the media, sometimes student do not realize the benefits to them in their daily life and at school (Maness K. 2004). Educational games can make student more focused, can increase understanding of the material, can build up friendship and lead to problem solving skills (Van Eck, R 2006). As a result of the objective of education at the current moment, students are needed to explore all the data and the idea themselves. However, it is not only intended to be implemented and to come to an end, but to know how essential it is for learners to learn and understands in a certain idea.

Woolfolk and Nicolich (1984) argued that concepts are categories used to group comparable occurrences, thoughts or items, abstractions, and mind-creation to organize experience. By forming a notion, we are able to organize the vast quantity of data we meet into meaningful units. The main aim of learning the idea of science is to attain a level of conceptual understanding.

Conceptual understanding is really related with cognitive aspect of learning. According to Bloom (2012), Cognitive domain is categorized into six: remember, understanding, application, analyzes, create and evaluation. Thus, basically conceptual understanding of science concept is measured by cognitive domain.

However, the conceptual understanding that students' process had mainly influence by the motivation learning, or vice verca as it is stated by Keller (1987)

ARCS Model of Motivational Design, there are four steps for promoting and

sustaining motivation in the learning process: Attention, Relevance, Confidence, and Satisfaction (ARCS). To develop any kinds of learning media, it needs to be aligning with the curriculum as the main. The research where was conducted is use 2013 National Curriculum. These mean that the implementation of quartet card games is expected to support the accomplishment of the goal of science instruction based of 2013 Curriculum. As mentioned above, the enhancement of these curricula by learners has some link with study treatment in the form of the capacity to inquire the content of science across the media, which will later have some impact on cognitive outcomes and a positive motivational response in teaching. In summary, that is why the quartet cards games is use as the alternative media which is categorized as educational card games is expected to have the positive effect of students on conceptual understanding and motivation in learning additives substances, that has never been research about this topic before.

1.2 Research Problem

According to the previous explanation about the background of why this study is conducted, the research problem of this study is “How is The Effect of Educational Quartet Card Game on Students’ Conceptual Understanding and Motivation in Learning Food Additive Substances”

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

1. How is the design of quartet card game as a media in learning food additive substances?
2. How is the effect of Quartet card games on students’ conceptual understanding in learning food additives substance?
3. How is the effect of Quartet card game on students’ motivation in learning food additives substance

1.3 Limitation of Problem

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

1. Educational Quartet Card Game

Educational Quartet Card Game is a game uses cards as the primary device with the game played to help students in learning activity in the class. In this study, educational quartet card game is a group of two-dimensional card which contain of picture and information of food additives substances. This card can be played with 3-5 participants.

2. Students' Conceptual Understanding

The conceptual understanding of this study focuses on the topic of food additives substances and it is divided into three sub-topics, which are is different kinds of additive substances, natural and synthetic food additive substances, and additive substances in food and drinks (Curriculum 2013). The student's conceptual understanding of this research also focuses on the student's capability to comprehend the topic of food additives based on core competencies and core competencies in the national curriculum for 2013. The conceptual understanding will be asses by using Taxonomy Bloom which are Remembering (C1), Understanding (C2), Applying (C3), Analyze (C4) (Andrson et al., 2001).

3. Students' motivation

Motivation in learning measured in this study involves some component from ARCS which are Attention, Relevance, Confidence, and Satisfaction based on Keller (1987).

4. Food additives substance

Food Additives is chosen as the chapter that the learned in this study. In this research, topic is food additives that limited by core competence number 3 and basic competence no. 3.6 that are attached in in Curriculum (2013). The topic to be elaborate into three sub-topics which are different kinds of food additives substances, natural and synthetics of food additives substances, and additive substances in food and drink.

1.4 Research Objective

This research objective is specified as follow:

1. To investigate design of quartet card game as media in learning food additives substance
2. To investigate the effect of educational Quartet card game on students' conceptual understanding in learning food additive substances.
3. To investigate the effect of educational quartet card game on students' motivation in learning food additives substances

1.5 Research Benefit

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

1. For Teacher

This study will give a reference for the teacher, especially science teacher. The teacher can use educational quartet card game as a teaching media in their teaching performance in class activity. By using educational quartet card game, the teacher can improve their quality of teaching performance in classroom's activity, especially in food additives substance and also can make the class and learning process more interesting to the students.

2. For Student

This study expects that the student who experiences a learning activity using Educational Quartet Card Game will increase their motivation to learn more and awareness about what they consumed. While students are motivated to learn, the student will improve their learning accomplishment. The research is anticipated to produce a fun and joyful learning activity for learners. The Education Quartet card game can improve beneficial peer interactions and can lead to a deeper understanding of the content.

3. Researcher

This study is anticipated to help future researchers who have comparable research interests, particularly in the field of educational Quartet card games and, more usually, in the field of game-based science education, particularly in the field of food additives substances.

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1.6 Organization Structure of Research Paper

This study consists of five chapters which include the following:

1. Chapter I: Introduction

This chapter consist of background, research problem, research objective, research benefit, organization structure of research, relevant research, and limitation of problem.

2. Chapter II: Literature Review

This chapter arranged by literature review of science learning, quartet card game, students' conceptual understanding and students' motivation and food additives substance.

3. Chapter III: Research Methodology

This chapter describes the research methodology that is used in this study, research design, population and sample, instrument, procedure, and data collection and analysis.

4. Chapter IV: Result and Discussion

This chapter explain result and discussion of this research based on data.

5. Chapter V: Conclusion and Recommendation

This chapter stated the conclusion and recommendation regarding the result bases on discussion on chapter IV.

