

CHAPTER I INTRODUCTION

A. Background

Science teaching has changed from a text-based to an activity based (hands-on) approximation. Since the methodologies used to teach science have changed, the way we assess what students are learning also needs to be modified. . “Authentic” assessments are intended to provide evidence about what students know and can do in a subject matter (Shavelson Lang and Lewin, 1994). There is should be techniques that provide more or less direct measures of students’ knowledge structures. Techniques, namely, concept maps, probe perceived concept relatedness more directly by having students build graphs or trees and make explicit the nature of the links between concept pairs (Shavelson Lang and Lewin, 1994). Stoddart (2000) selected concept map as assessment tools because the technique could be used with a wide range of content and with students at all grade levels.

Objective test as assessment has its limitation as it mostly only cover lower level of cognitive and high possibility of student to make speculation of answer. In subjective test the limitation is because of its low reliability and validity (Arikunto, 2003). Other than that the quality of responses may be influenced by a variety of factors that have nothing to do with knowledge that being assessed (McClure, Sonak and Suen, 1999). As assessments using objective and subjective test have some limitation, McClure, Sonak and Suen (1999) suggest that assessments based on concept mapping tasks may strike a balance between desired objectivity and sensitivity to the structure of students’ knowledge.

Remembering the concept is most common way of learning done by students these days. Generally, pupils memorize the content and reproduce the same to pass the examination. In such an environment creative thinking, interest in inquiry activities and other skills for example problem solving skills, cooperative skills cannot be developed among them. To

help student develop skills like mentioned above Concept Mapping is the right technique to choose (Dahaka, 2012). Ahuja (2013) stated that the process of finding science is more important than the product itself, because the way of exploring the truth and knowledge always given more preference than memorization or gaining knowledge of the accumulated facts. One potential of finding is “concept mapping”. Concept map constructed by a student is interpreted as representing important aspects of the organization of concepts in that student’s memory or cognitive structure (Shavelson Lang and Lewin, 1994).

Concept mapping method was developed by Joseph Novak’s research team in early 1970s. As concept map is about finding relation between every concept, meaningful learning is occurred while constructing concept map. Pie, Tamarit and Portero (2011) stated that method of concept map is based on the meaningful learning theory of Ausubel and it assumes that learners construct knowledge, being already influenced by previous knowledge. Because concept map is hierarchical this will help student in processing meaningful learning. When meaningful learning take place there is some change in our cognitive structure, it modify the previous concept and relate it with the new one so the learning remain more time and it can be applied by the student in daily life.

Concept map as have various potential function. According to Novak’s remarks, we may organize the potential of concept mapping to improve science education into four categories; as a learning strategy, as an instructional strategy, as a strategy for planning curriculum, and as a means of assessing students ‘understanding of science concepts (McClure, Sonak and Suen, 1999). As concept maps can be used as a knowledge representation tool to reflect relationships that exist between concepts that reside within an individual’s long-term memory (Lawson and Hershey, 2002). Concept mapping can detect the extent of understanding of concepts and structure of knowledge. Concept maps as evaluative

measures are able to reflect differences in the concept and propositional knowledge of students (Ahuja, 2013).

Table 1.1 Correlations between Concept Map Scores and Measures of Achievement and Ability

Achievement/Ability	Correlation
Essay test on unit	0.69
Stanford Science Achievement Test	0.66
School science grades	0.49
Otis Lennon School Ability Test	0.74

(Anderson & Huang: 1989)

As shown in Table 1.1 Several studies show that concept map has strong relation with students' cognitive. The use of concept map as potential assessment tools is in line with concept map function as knowledge representation tool (Lawson and Hershey, 2002). In this research correlation between concept map and paper pencil test in learning urinary system is being investigated. Investigation including whether there is significant correlation or not between concept map and students' paper pencil test as paper and pencil test is commonly use to assess student understanding. While, according to Arikunto (2013) paper and pencil test that used to assess student mostly limit in lower cognitive level (C1-C3). In this research paper and pencil test that consist of essay (subjective test) and multiple choice (objective test) will be involve higher level of cognitive. As McClure, Sonak and Suen (1999) stated that concept map can balance the objective and subjective test assessment, the profile of student concept map and paper pencil test is also investigated.

Urinary system is one concept that shows how science is integrated and work together to make a system work. In urinary system there is a lot of concept involve that would make student difficult to memorize all concept. Making concept map can help student in organizing the concept of urinary system as concept map has function as knowledge organizing

tools (Pie, Tamarit and Portero, 2011). Student should be able to identify the relation between every concept in order to know how this concept can work together to function a system.

In learning urinary system there is some integration of concept. Biology is not the only concept that involve in learning urinary system. Some concepts about diffusion and transport active is involving physic concepts. According to Dahaka (2012) concept map shows the inter-relationships among concepts that would help student to find inter-relationships among concepts. Concept map also expected to be able to help student to explore more about this topic using their previous knowledge as concept map underlined theory of meaningful learning.

B. Research Problem

The research problem of this study is “How is The Profile of Student’s Understanding on Urinary System through Paper Pencil Test and Concept Map?”

C. Research Question

Elaborating the research problem, the research attempts to explore b following questions:

- a. How is the profile of students’ understanding on learning urinary system through paper and pencil test based on its cognitive process and concept?
- b. How is the profile of students’ understanding on learning urinary system through concept map scored based on its legibility, accuracy, completeness and sophistication?
- c. Is there any correlation between student paper pencil test and concept map on learning urinary system?
- d. What factor explains the correlation between students’ pencil paper test and concept map in learning urinary system?

D. Limitation of Problem

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

- a. Students understanding is analyzed through the profile of concept map includes its legibility, accuracy, completeness and sophistication that scored based on Mullers' Classroom Concept Map Rubric. Profiling also include concept of urinary system that used by students in constructing their concept map. Profiling of paper and pencil test was based on its level of cognitive and concept in urinary system.
- b. Correlation of paper and pencil test and concept map is analyzed by Spearman Correlation Coeficeient.

E. Research Objective

This research objective is specified as follow:

- a. To investigate the profile of student's understanding on urinary system through paper and pencil test.
- b. To investigate the profile of student's understandings on learning urinary system through concept map.
- c. To investigate whether there is correlation between student concept map and paper pencil test in learning urinary system.
- d. To investigate factors in correlation between student concept map and paper pencil test in learning urinary system.

F. Research Benefit

The result of this study is expected to provide the following benefits:

- a. For teacher, this research is expected to be a reference for teacher in using concept map in learning to improve students' cognitive and motivation.
- b. For students, helping the students to construct the concept of urinary system.

- c. For another researcher, hope this research can be material of study in using concept map for different variable and problem.

G. Organization Structure of Research Paper

In order to get organized structure of paper, this research paper is arranged based on the following organization structure:

1. Chapter I : Introduction

This chapter describes about the background of the research and continue to the problem proposed as well as its limitation. This chapter also explains the aim of the research and also the significance of the research in the same field of study.

2. Chapter II: Literature Review

This chapter explains some literatures and supportive theories of the research. The basic explanation of concept map, the use of concept map in assessment and the concept that is being investigate; urinary system.

3. Chapter III : Methodology

This chapter explains about research procedures, research object, the type of research, how the data are being collected, the instruments used, and the research plot.

4. Chapter IV : Result and Discussion

In this chapter, the interpretation of all of the research data is served. Then the discussion are followed after, it analyses the result of research and its correlation between the result and the theories.

5. Chapter V : Conclusion and Recommendation

This is the last chapter of this research, all of research questions are concluded based on the result. The suggestion that derived from difficulties and obstacles found in this research are shared in recommendation part.