

CHAPTER I INTRODUCTION

1.1 Background

The important of metacognition in the process of learning is not an old idea although the emergence of the term metacognition and metacognition research field has been traced in the last four decades. Sometimes people use the phrase 'going meta' when talking about metacognition, referring to the process of stepping back to see what you are doing, as if you were someone else observing it. "Going meta" means becoming an audience of your own performance in this case, your own intellectual performance. Furthermore, Jaleel (2016) stated that metacognitive is knowledge about how to learn, thinking awareness about what is known and what is unknown. It is a regulatory system that helps a person understand and control his or her own cognitive performance and allows people to take charge of their own learning, thus it affects achievement.

A research conducted Rani and Govil (2013), metacognitive or learning strategies that are perceived under students control will positively or negatively affect their academic achievement. This means, once students are able to identify the cognitive processes they utilize in their own learning, they can then learn to regulate them, making use of their own optimum cognitive strategies. Their abilities to use their cognitive strategies are essential in problem solving case.

According to Bull et al (2010) problem solving is one of many skills that most often cited when referring to 21st century skills. It is increasingly being recognized as attribute that separate students who are prepared for a more and more complex life and work environment in the 21st century. Problem solving, being one of the learning of complex judgmental skills, is involved in High Order Thinking (HOT). HOT expects students to solve problems and develop meaning for themselves (Burton, 2010).

Biology is a branch of science which is a metacognitive activity which continually question itself, probing, and testing robustness of accumulated knowledge, concerned with the study of life and living organism. Genetics, being one topic taught in biology at the high school level, is a particularly difficult

subject for students (Karagoz and Cakir 2011; Haambokoma, 2007). Genetics is an important aspect of secondary education as it improves students' understanding of the inheritance and provides opportunities for students to learn important problem solving skills.

Taking a proactive approach by designing an environment specifically for problem solving and metacognition will significantly develop students' metacognitive skills. Yasir et al (2015) stated that a metacognitive based biology learning tool is very important and useful for practicing reflective thinking skills in order to sharpen the thinking ability in constructing knowledge by engaging in metacognitive activity. This engagement are in the form of planning, monitoring, arrangement, and evaluation of the cognitive activities results. This activities help students find information sources and experience to solve life problems, which imply the future that can train a person to become independent, critical, and honest person.

Learning tools can be developed to promote metacognition which engage students in self-monitoring their own problem solving approaches. The ability to self-monitor their own problem solving include into metacognitive awareness.

From the preliminary study, the interview with teacher and analysis of questionnaire distributed to class XII IPA MAN 2 Model Medan: (1) students had difficulty in understanding the abstract materials of genetics, had negative attitudes toward genetics, found it hard to understand the concept, was unable to carry out mathematical calculations involving probability in genetics, had poor understanding about the materials being presented. Moreover, the value of term assessment for genetics in the academic year 2016/2017, showed that $\pm 57\%$ of students had not reached the minimum criteria of completeness (Kriteria Kelulusan Minimum). (2) Approximately 53% of students were bad in planning their learning activities inside and outside classroom, and also in classifying biology learning course materials that they did not understand / confused about. Furthermore, about 27-40% students have average ability in routinely doing biology questions, understanding their strategies in learning biology, understanding what biology course materials that need different time allocation to study, understanding learning supports available to improve learning achievement

in biology and understanding which part of their exam preparation that can not help to improve learning achievement in biology.

The above results indicate that students possess low metacognitive awareness, however, it should be noticed that a variety of strategies can be used to provoke it. Aurah *et al* (2014) suggest the usage of embedded metacognitive prompting on questions during the test. It is important because it provide thought provoking information designed to stimulate and facilitate the problem-solving process. Metacognitive prompting help students stay on task, keep of their effort and progress.

Zhang *et al* (2015) claimed that metacognitive prompting could enhance students' on planning and analyzing their skills. Metacognitive prompting could connect the content knowledge to students' self-understanding resulting on self-regulation strategies, such as selecting and monitoring strategy, evaluating process and outcomes. Further research concluded that metacognitive prompts gives positive effect on problem solving performance in Mathematics (Hoffman and Spatariu 2008), Physical Education (Chatzipanteli and Digelidis, 2011) even Genetics (Aurah *et al*, 2014).

The using metacognitive prompting in Genetics test to guide students can activate the problem solving strategies they have learned during their studies. Metacognitive prompting in genetics is important because it contained several components that could solve problem that contributed to difficulty in learning genetics such as negative attitudes (Haambokoma, 2007). In the context of problem solving in genetics, students' metacognitive awareness can be prompted through asking the following questions before they begin a task: "What do you already know about this problem?" "What is the goal or reason for engaging in extended and careful thought about this problem?" "How difficult do you think it will be to solve the problem?" "How will you know when you have achieved the goal?" As students work on a problem, they should be asked to assess their progress, and when the task is completed, to be asked how well the problem was solved and what they learned from solving it.

In Indonesia, despite the apparent benefits of metacognitive prompting in learning basic math and science concepts especially in genetics, the research to

apply this metacognitive prompting to do problem solving aspect is rarely established. So that is why the writer of have interested to reveals about the effect of provoking metacognitive prompting during genetics problem solving test on gender. It is encourages the writer to do research with title “**The Effect of Provoking Metacognitive Prompting during Problem Solving Test on Students’ Genetics Score of Class XII IPA at MAN 2 Model Medan**”.

1.2 Problem Identification

Based on the elaboration of the background of the study, the problems are identified as follows:

1. Students have difficulty in understanding the abstract materials in genetics.
2. Students possess’ negative attitudes, unable to carry out mathematical calculations involving probability , and hard to understand the concept towards genetics learning.
3. The method of embedding metacognitive prompting on question during the test rarely used to provoke metacognitive awareness
4. The importance of metacognitive prompting in genetics that could solve problem that contributed to difficulty in learning has never used before.

1.3 Problem Scope

In order to make this research become more focus, this research will discuss the limited problem as follows:

1. Metacognitive prompting (MP) during Genetics Problem Solving Test (GPST) influence students’ genetics score.
2. Gender influence students’ score on the GPST

1.4 Research Questions

1. Is MPduring Genetics Problem Solving Test (GPST) significantly affect students’ genetics score ?
2. Is gender significantly affect students’ score on the Genetics Problem Solving Test (GPST)?

1.5 Research Objectives

1. To know the effect of metacognitive prompting (MP) during Genetics Problem Solving Test (GPST) influence students' genetics score
2. To know whether gender affect students' score on GPST

1.6 Research Contributions

The research finding be useful for:

1. To get data about metacognitive prompting (MP) and its effect during the genetics problem solving test (GPST) influence students' genetics score.
2. To provide information to other researchers who are interested in doing further research
3. To provide additional information to the teachers in order to apply metacognitive prompting in improving student learning outcomes
4. To improve the learning process by applying metacognitive aspects to boost the learning outcomes.