

CHAPTER I

INTRODUCTION

1.1. Problem Background

Education in Indonesia has always undergone improvements which in the end produce a quality education product or result. Various efforts have been made in order to improve the quality of existing education, to be able to create a reliable future generation capable of facing various life challenges. These improvements include the improvements in the education system or things directly related to learning practices. The policy on the 2013 curriculum was designed by the Indonesian government through Ministerial Regulation No. 22 of 2016 concerning process standards, it is clear that as a curriculum improvement plan it is expected that students can develop themselves in thinking. Students are required not only have lower order thinking skills (LOTS), but also higher order thinking skills (HOTS). According to Krathwol and Anderson (2001), states that indicators for measuring HOTS include analyzing (C4), evaluating (C5), and creating (C6) (Nuragni, 2018).

According to Retnawati (2018), HOTS is most easily identified through Bloom's taxonomy. With revised Bloom's taxonomy proposed by Anderson and Krathwol (2001), HOTS indicators can be easily formulated in learning. In the revised Bloom's taxonomy, the cognitive process dimension is seen as a verb which serves to describe a particular process, while the knowledge dimension is seen as a noun which functions as the object of the process carried out. The existence of these two components (verb and noun) is the reason why formulating indicators in revised Bloom's taxonomy is easier.

Cognitive process which is included in HOTS category, which is analyzing, evaluating and creating, it can be categorized that analyzing and evaluating is part of critical thinking, while creating is part of creative thinking. Analyzing and evaluating is part of critical thinking based on the elaboration of the definition of critical thinking, namely as a process of passing judgment based on evidence (Eggen and Kauchak, 2012), based on evidence (Arends and Kilcher, 2010). While creating can be considered as part of creative thinking in accordance with

the opinions of experts, that creative thinking is a process to produce products, ideas, something new (Presseisen in Arends and Kilcher, 2010).

Critical thinking is thinking that examines, connects and evaluates all aspects of a situation or problem, including its performance gathering, organizing, remembering and analyzing information (Helmawati, 2019).

Halpern (2014) stated that critical thinking is the use of those cognitive skills or strategies that increase the probability of a desired outcome. It is used to describe thinking that is purposeful, reasoned, and goal directed – the kind of thinking involved in solving problems, formulating inferences, calculating likelihoods, and making decisions, when the thinker is using skills that are thoughtful and effective for the particular context and type of thinking task.

According to Sani (2019), critical thinking is convergent thinking, whereas creative thinking is divergent thinking, convergent thinking is a process of processing information from various points of view to get conclusions. Whereas divergent thinking is the development of the mind from an information into various ideas or points of view. Individuals who are able to think creatively will be able to produce new concepts, ideas or products that are different from existing concepts, ideas or products. The ability to think critically and think creatively (higher order thinking skills) is needed by someone in solving a complex problem.

Cimer (2012) and Tekkaya (2001) said that biology is difficult for some of students due to some of the concepts are difficult to comprehend and using English and Latin terminology in most of the context which means the students need to think in higher level to learn about the subject. Tekkaya (2001) also found that the Structure and Function of Plant Tissue topic is perceived by students as difficult topic, along with Water Transport in Plants, Protein Synthesis, Respiration and Photosynthesis, Gaseous Exchange, Physiological Processes, Hormonal Regulation, Oxygen Transport, and Genetics. Utami (2016) in her research also found that the topic of Structure and Function of Plant Tissue has similar situation. The nature of the content, with lots of sub topics in it have led student to similar findings worldwide. The characteristics and function of each permanent tissue in plants, comparison of the cell structure of various plant tissues in the figure, the kinds of tissue of the vegetative and generative organs, and the

anatomical differences between monocot and dicot plants are some to mention. Based on the reason above, the researcher chose the Structure and Function of Plant Tissue as the topic for the research.

SMAN 2 Kisaran is one of the best schools in Asahan Regency, it is evident from the achievements obtained in academic, sports, students exchange abroad, arts, etc. The students come from various regions in North Sumatra Province (before the zoning system was implemented). The test that was applied to the acceptance of new students resulted in students who were accepted at SMAN 2 Kisaran the best students. As one of the most motivated schools, it is important for researchers to ensure that students reflect higher order thinking skills (HOTS) such as critical thinking and creative thinking. SMAN 2 Kisaran has applied 2013 Curriculum for all levels.

Based on the experience of the researcher teaching in class XI of SMAN 2 Kisaran, in general learning is taught by the lecture method and question and answer. This condition is contrary to the curriculum used, namely the 2013 curriculum. In the learning process the teacher is more active than the students. Such conditions make students passive and just stay in the seat receiving the material delivered by the teacher. So that students only memorize what is delivered by the teacher, students are less responsive in solving problems, less happy to learn with a model of discussion that can find their own understanding, have not been able to maintain opinions, and are less happy to solve questions that require students' thinking skills. Learning at SMAN 2 Kisaran is often directed towards academic abilities that focus on mastering concepts and low levels of thinking, so that they have not reached the stage of higher order thinking. Therefore, researchers want to improve the higher order thinking skills of students at SMAN 2 Kisaran by familiarizing students with completing HOTS-based questions so that learning activities not only focus on the ability to memorize only.

Based on the background describe above, the researcher thinks that it is necessary to conduct the research about **“Analysis of Students’ Higher Order Thinking and Critical Thinking Skills on Plant Tissue Topic in Grade XI Science SMAN 2 Kisaran Academic Year 2019/2020”**.

1.2. Problem Identification

Based on the background described above, researcher identifies the research problems as follows:

1. The lack of questions based on higher order thinking and critical thinking skills (still not fully implemented by the teacher)
2. Students are not familiar with HOTS and critical thinking questions, they assume the questions have a high level of difficulty.
3. Students are not familiar with the higher order thinking based learning.
4. The learning process applied has not fully followed the K13 which requires students to have higher order thinking and critical thinking skills.
5. The concept plant tissue topic is considered as difficult to comprehend and memorise which needs the higher order thinking and critical thinking skills when learning about the topic.

1.3. Problem Scooping

Based on problem identification, the researcher limits the problem to the Students' skills in class XI Science SMAN 2 Kisaran academic year 2019/2020 in solving biology questions based on higher order thinking and critical thinking skills that can be obtained from students' learning outcomes in answering biology questions in the form of multiple choice and essay test . The questions in this research are limited to Plant Tissue topic which is compiled by observing the level of higher order thinking skills and critical thinking skills questions based on the cognitive domain in revised Bloom's taxonomy.

1.4. Research Questions

The research questions are formulated as follows:

1. How the students' cognitive level in answering critical thinking skilld questions on plant tissue topic in grade XI of SMAN 2 Kisaran academic year 2019/2020?
2. How the students' cognitive level in answering higher order thinking skills questions on plant tissue topic in grade XI SMAN 2 Kisaran academic year 2019/2020?

1.5. Research Objectives

This research is conducted to achieve some objectives as follows:

1. To know students' cognitive level in answering critical thinking skills questions on plant tissue topic in grade XI of SMAN2 Kisaran academic year 2019/2020.
2. To know students' cognitive level in answering higher order thinking skills questions on plant tissue topic in grade XI SMAN 2 Kisaran academic year 2019/2020.

1.6. Research Significances

This research is significantly contributed for:

1. Exercising the students' higher order thinking and critical thinking skills by giving them higher order thinking and critical thinking problems based on cognitive domain in revised Bloom's taxonomy.
2. Knowing the students' skills in answering higher order thinking and critical thinking questions in plant tissue topic.
3. Improving the quality of learning process in the classroom by making this research as an additional reference in understanding the implication of plant tissue topic in students life.
4. As source of information for other researchers who are interested to do further research.
5. Expected to be an additional materials, thinking and innovation development for the teachers in improving the quality of teaching process in the school or another educational institution.

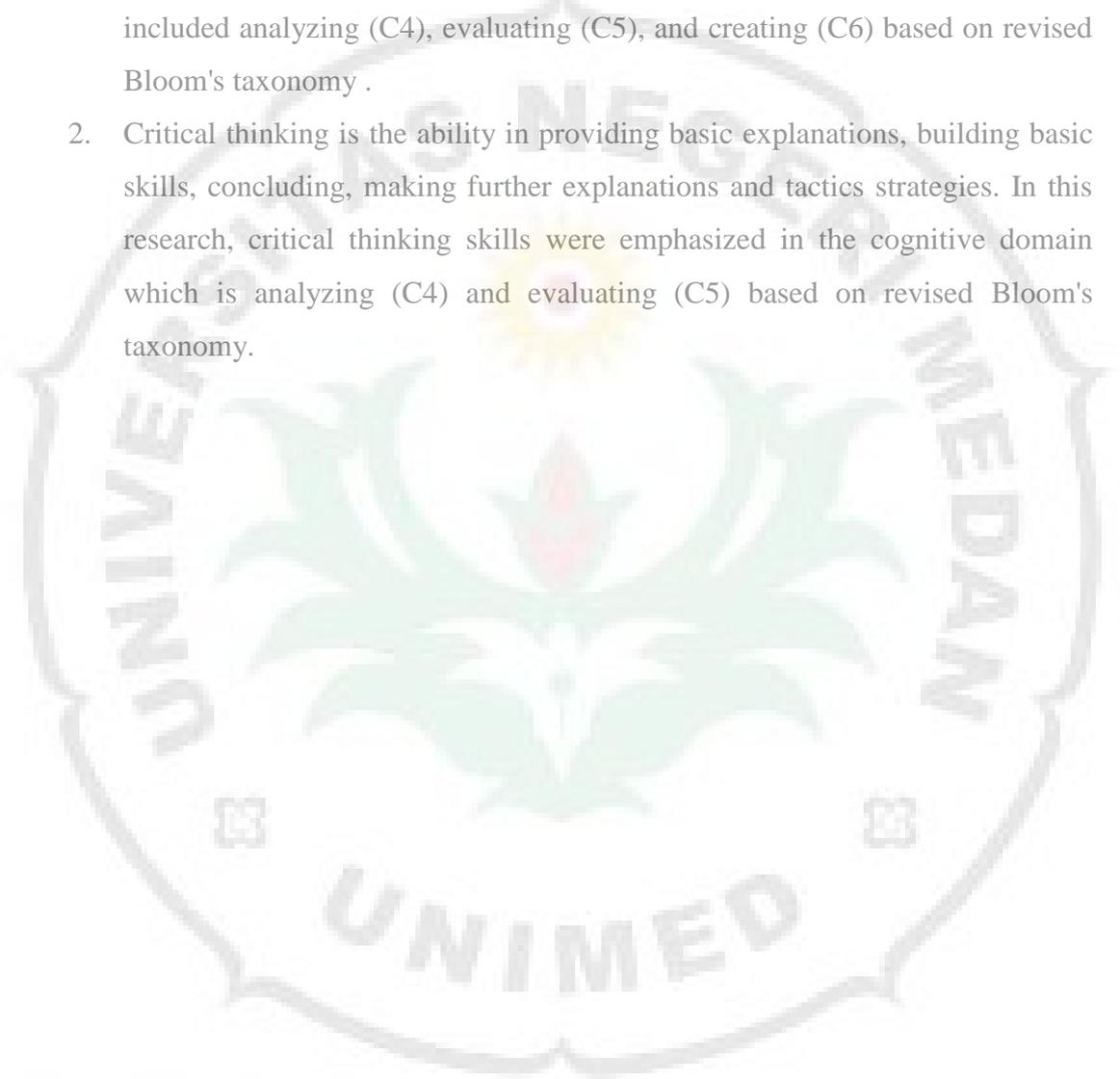
1.7. Operational Definition

To get same perception and avoid the difference of interpretation of some terms in this research, it is necessary to put forward the operational definition as follows:

1. Higher order thinking is a thinking process that involves mental activity in an effort to explore complex, reflective and creative experiences that are carried out consciously to achieve the goal of acquiring knowledge which includes

the level of analytical, synthesis, and evaluative thinking. In this research, higher order thinking skills were emphasized in the cognitive domain which included analyzing (C4), evaluating (C5), and creating (C6) based on revised Bloom's taxonomy .

2. Critical thinking is the ability in providing basic explanations, building basic skills, concluding, making further explanations and tactics strategies. In this research, critical thinking skills were emphasized in the cognitive domain which is analyzing (C4) and evaluating (C5) based on revised Bloom's taxonomy.



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