Using Metacognitive Strategy to Teach Mycology

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Abstract. The research aims at exploring Indonesian students'metacognitive skills, understanding of mycology concept in the learning process implemented of metacognitive strategy. The metacognitive skills included ability to determine the level of confidence and ability to judge oneself.There were 41 subjects studied using a pretest-posttest design. Result showed that there was increase in student's metacognitive skills and their understanding of mycology concept. Fortunatly, the students stated that they had got a lot of experiences and benefits after learning process. This research concluded that metacognitive strategy can be used to teach mycology in order to students can reach the learning objectives.

Keywords: metacognitive strategy, teach, mycology

1. Introduction

It is very important for teacher be able to create a situation where students can easily process and understand the information especially the concepts related to mycology being embedded to their long-term memory [1]. Concepts that must be understood by students who study mycology include the terms used in studying mycology, fungi classification, special characteristics of each fungi group, reproduction of fungi and the role of fungi in the life of organisms on earth. Based on the latest learning theories that state that learning is actually building its own knowledge, therefore the teacher must teach students to use learning methods that activate students, make students aware of their own thinking processes, able to determine the level of confidence in their learning outcomes and be able to judge themselves.

One of the instructional strategies in biology class is metacognitive strategy.The use of metacognitive strategy often has a solid association with improving students' achievements especially in science learning as it involves awareness of self-thinking measured with an appropriate strategy in the learning context [2][3]. Metacognition is a set of skills that enables students to recognize how they learn, evaluate and adapt the skills in order to achieve an effective learning process. Metacognitive skill plays an important role in most problem-solving activities faced by students in daily classes [4] [5]. Metacognitive strategy is considered to be more salient than other ones in conducting practice-based learning [6].

In this research, the metacognitive strategy is used to teach mycology concept to students, covering both the theoretical concept and student's metacognitive skill. As its implementation, lecturers either suggest they should use metacognitive strategy or inform them about a concrete way and situation where to apply the metacognitive strategy [7].This research focuses on how to teach the concepts of

mycology to students. The teaching and learning process, revealed in this research, uses the metacognitive strategy. Through its application, it does not merely teach students related to mycology concepts, rather, it develop students metacognitive skills especially ability to determine the level of confidence and ability to judge oneself . As a basic idea, this research aims to know the students understanding of mycology concept, ability to determine the level of confidence and ability to judge oneself.

2. Methods
The participants in the research were 41 students, who were in their second year of study and were enrolled in the Biology Department at Universitas Negeri Surabaya. Their age ranged from nineteen to twenty. They had already taken General Biology and Microbiology as the prerequisite courses. The first stage is preparation stage. In the stage was done the development of learning tools that include learning implementation plans, individual student worksheets, student books, group worksheets (whose contents are the same as individual student worksheets) and key answers to student worksheets. Pre test and post test sheet with the answer key. The second stage was action or implementation stage. In this stage, the students answer the question contained in individual student worksheets. In addition, to answering the questions was given, students must also wrote the level of confidence in the answers was given and gave the quantitative score for the answers of the questions. The teacher collects data based on the yield on individual student worksheets. Then students were organized into study groups and were given student books for discussion. Then, in the group students were asked to answer the question on the group student worksheets through discussing and referring the student books. Students were asked to compare their answer between individual and group student worksheets, wrote down their level of confidence and gave the score for their answers on the group student worksheet. The last, student matched the results of their work with the key of student worksheets provided, and presented the results. The teacher provides feedback and reinforcement [8].

The students test score was collected by test method (comparing pre test and post test score). The data related to the students test score. Ability to determine the level of confidence and ability to judge oneself was collected by observing the student's writing on the worksheet. There are three indicators in this research namely understanding the concepts related fungi, ability to determine the level of confidence and ability to judge oneself. Each indicator was assessed using 1 to 4 score as following Table 1.

Table 1 Scoring technique for understanding concepts and metacognitive skill

Indicator	Score			
	1	2	3	4
Understanding the concepts related fungi	The student answer same no the answer key or < 24% the answer like to the answer key	The student answer 25-49% like to the answer key	The student answer 50-74% like to the answer key	The student answer 75-100% like to the answer key
Ability to determine the level of confidence	The answer was wrong, but she/ he was confident that the answer was correct.	The answer was correct, but she/he was not confident that the answer was correct.	The answer was wrong, and she/he was not confident that the answer was correct.	The answer was correct, and she/ he was confident that the answer was correct.
Ability to judge oneself	The judge like to the teacher judge (< 24% similarity)	The judge like to the teacher judge 25-49% similarity)	The judge like to the teacher judge (50-74% similarity)	The judge like to the teacher judge (75-100% similarity)

The data related to understanding turgor were analyzed using n-gain score, while the ability to determine the level of confidence and ability to judge oneself were analyzed qualitatively in the form of description.

3. Result and Discussion

The results of n-gain scores from the pretest and posttest given to student indicated that the understanding concept related to fungi by the student increased. There were three categories of different levels of improvement, namely low, middle, and high. In this research, the n-gain scores obtained from 41 students were 10% (categorized in low level), 40,5% (categorized in middle level), and 49,5% (categorized in high level) like the following Figure 1.
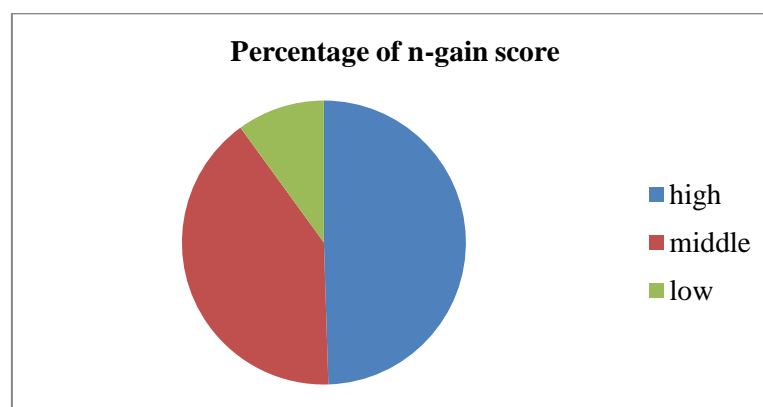

Figure 1. The n-gain score: pre test and pos test of understanding concept of biology student

The result of ability to determine the level of confidence by the students shown good result. This mean that the students had high level of confidence 10% (score 1), 11% (score 2), 25,5% (score 3) and 53,5% (score 4) like Figure 2 below.
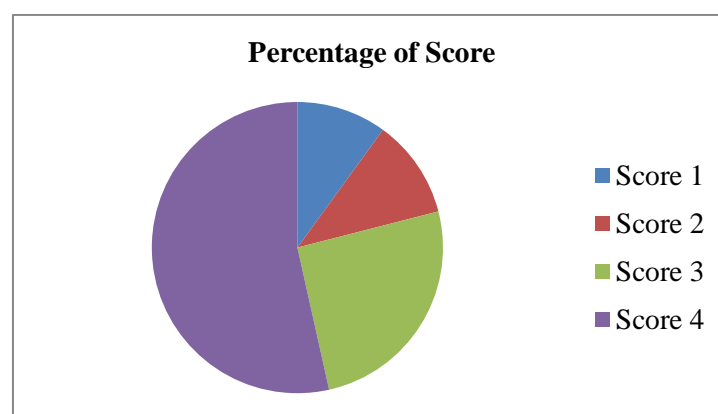

Figure 2. The percentage of each score for ability to determine the level of confidence of the students

The result of ability to judge oneself revealed that the students had good ability to give the score of her/his job, 0% (score 1), 3% (score 2), 8% (score 3) and 89% (score 4), like following Figure 3.
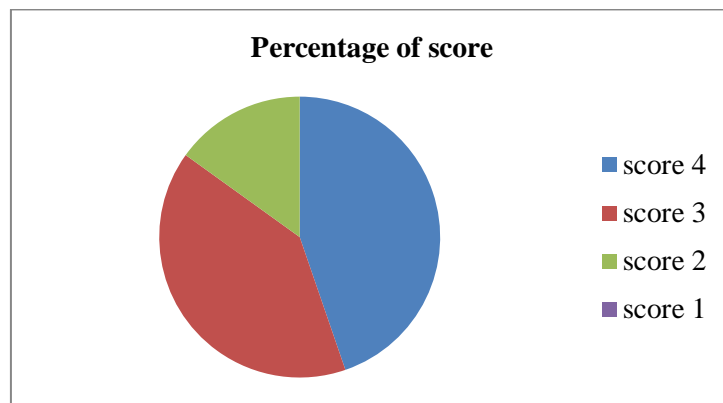
Figure 3. The percentage of each score for ability to judge oneself of the students

This research shows that the metacognitive strategy can help the student to understand the concepts related fungi in Mycology subject matter. This result indicates that the student' metacognitive skills can be explored with the use of the metacognitive strategy. The metacognitive strategy is assessed based on two indicators, namely ability to determine the level of confidence and ability to judge oneself. During the assessment of the student, some interesting findings related to indicators were revealed after they had been taught about Mycology through the metacognitive strategy. The student' capability of evaluating themselves, determining scores shown good result. The students' self-evaluation results can give teachers a lot of important information about how well the students understand the tasks and how this information can improve the teaching and learning process [9]. The improvement indicator in comparing concepts is relevant to the research conducted by Ozsoy & Ataman [10], in which the steps in the metacognitive strategy may help the students to achieve the highest cognitive process and to find good solutions, to train to connect the previous concepts with the recent information. The steps of the learning procedure in applying the metacognitive strategy in this research were the following: the students were asked to (1) write their schemata or previous knowledge, (2) write their recently acquired or new knowledge, after explored the student book and discuss each others (3) compare both, and (4) self-assess their concept understanding by wrote the level of confidence and give score for her/his job.

The test results of Mycology of each assessment show that the metacognitive learning

strategy can help students to promote their understanding Mycology concepts directly.Wilson & Bai [11] explained that metacognitive knowledge had a significant metacognitive influence on the method understanding of metacognition.Their results show that teachers who have a good understanding of metacognition still need to possess the metacognitive concept and strategy to make students understand metacognition well. It shows the rationale of learning strategies taught with the use of the metacognitive strategy. Mycology is taught to make the students become good future researcher and reflective and critical thinkers. The improvement of understanding Mycology concepts completion is indicated through the increase in the student's N-gain scores.

4. Conclusion

This research suggests that the metacognitive strategy can be used to teach Mycology subject matter to develop students' metacognitive skills and understanding of Mycology concepts. Students who have a knowledge related to learning strategies can determine a relevant strategy to learn materials precisely. It is important to further cooperate with others teacher to implement the metacognitive strategy in other subject matter in order to students can reach the learning objectives and have metacognitive skills.

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