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The Effect of Ethno Science Approach and Critical Thinking Ability to the Learning Outcomes in the Fungi Matter of the X Grade Senior High School Students

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Abstract:
This study was purposed to determine the effect of ethno science approach and critical thinking ability on the learning of fungi matter. Ethno science approach was a strategy for creating learning environments and designing learning experiences that integrated culture as part of the learning process. Crititical thinking ability was the ability of everyone to think organizedly in seeing and solving existing problems by connecting all aspects to evaluate the possibilities that existed. This ability would improve a deep understanding, create meaningful learning, and lead to increased learning outcomes. This study used a quasi-experimental method with a 2 x 2 research design. The data of this research were collected by using the instruments of Fungi matter test results and critical thinking tests. The research sample were 14 students of the X grade students. The results of data analysis showed that the data were normally distributed in each experiment and homogeneous in each group as amount as 0.393. The results of the study showed 1) learning approach had an influence toward learning outcomes 2) critical thinking ability had no effect toward learning outcomes 3) learning approach and critical thinking ability did not have significant interaction toward learning outcomes.

Keywords: *Ethno science, critical thinking, learning outcomes*

1. Introduction

Learning is a process that is carried out between students and the environment so that allows the change of attitude and behavior for better direction (Winarni, 2013). According to Facione (2015) a better direction of a person is very necessary considering that in the end students will become the part and contribute for the society. One of the abilities needed to be able to contribute is critical thinking ability.

The critical thinking ability is one of the abilities that must be possessed by students as subjects in the learning process. This ability will improve a deep understanding, create meaningful learning, and lead to increased learning outcomes (Cano and Maryinez in Prihartiningsih, et al., 2016).

Scientific learning is expected to create a balance or harmony between scientific knowledge and scientific attitudes application, as well as the values of wisdom that exist in science itself. Learning by using the concept of culture as a learning resource known as ethnoscience can improve students' ability in scientific knowledge (Gunstone in Sudarmin, 2014). Therefore, the socio-cultural environment needs to get serious attention in developing science education because there are values that are useful for life.

The development of ethnoscience-based learning tools is an approach in creating learning environments and designing learning experiences that integrate culture as the part of the learning process (Atmojo, 2012). The ethnoscience approach is not a new approaach in Biology learning. Previous research using subak objects, biodiversity, human reproduction system, and ecosystem concept shows that this approach will provide a meaningful learning. Ethnoscience is a transforming activity between original science which consists of all knowledge about the facts of the society that comes from hereditary beliefs and still contains myths. The scope of ethnoscience includes the fields of science, agriculture, ecology, medicine, even including flora and fauna (Rahayu and Sudarmin, 2015).

Scientific learning with ethnoscience approach relates learning with culture through extracting students' original views on culture, and then turn it into scientific knowledge (Sudarmin, et al., 2017). The implementation of this kind of

learning has the potential to develop the ways of learning from teacher-centered (teacher centered learning) become student centered learning (Novitasari, et al., 2017).

According to Sahlan (2012), the facts show that the noble values of our society's life have begun to wear off. Many local wisdom values starts being ignored by local people, especially young people, as a result of the globalization era. One of the cultures that develop in the society is the public's interest in consuming soya bean steak in their daily lives. According to Unesco in Arlianovita et al., (2015) soya bean steak is a part of the culture. In the X grade Biology learning in the Fungi matter, there is a learning competency to make food products using fungi. One of the food products that has the activity process is making soya bean steak. This manufacturing process is only known by the hereditary relationships and has nothing to do with learning activities at school. The process of making these kind of food product actually implements scientific steps that have been known and carried out before by the society. By bringing culture in the realm of learning process to make food products from fungi, it will foster motivation and involvement of the students in the learning process.

The active involvement of students in learning process will find the noble values in society that are instilled through the life experiences and a sense of empathy toward the environment. Therefore, teacher shall not only convey the theory, but also accelerate the process of transferring the noble values through the learning activities. The noble values and culture in making these food products are expected to improve the students' analytical ability in relating the relationship between culture and science. It will improve students' critical thinking ability, from the level of accepting concepts from teacher to become students who are actively finding answers, interpreting and even evaluating a process. Based on the facts exist, this study will examine the learning by using the ethnoscience approach and the critical thinking ability of students to get better learning outcomes.

2. Research Method

This study used Quasi Experiments which would be carried out using two (2) classes with one class as an experimental class (using the ethnoscience approach) and one class was used as a control class (using the scientific approach). The research design was illustrated in Table 1.

Critical Thinking Ability (B)	**Learning Approach (A)**	
	Ethnoscience (A_1)	Scientific (A_2)
High (B_1)	A_1B_1	A_1B_2
Low (B_2)	A_2B_1	A_2B_2

Table 1: the Effect of Ethno science Approach and Critical Thinking Ability on Student Learning Outcomes Research Design

- Explanation
  A1B1: Students learning outcomes who have high critical thinking ability with the ethnoscience approach.
  A1B2: Students learning outcomes who have high critical thinking ability with the scientific approach.
  A2B1: Students learning outcomes who have low critical thinking ability with the ethnoscience approach.
  A2B2: Students learning outcomes who have low critical thinking skills with the scientific approach.

3. Research Findings and Discussions

The results of this study were the data of (1) students learning outcomes and (2) critical thinking ability test. The data description presented in the results of this study consisted of the students' results using the ethnoscience and scientific approach and critical thinking ability test that were grouped according to high and low critical thinking groups.
The calculation results of the students learning outcomes by using the ethnoscience approach were 58 as the lowest score as amount as one (1) student and 92 as the highest score as amount as one (1) student with 78.00 as the mean score and 7.790 as the standard deviation. The calculation results of the students learning outcomes by using the scientific approach were 49 as the lowest score as amount as one (1) student and 90 as the highest score as amount as one (1) student with 71 as the mean score and 11.72 as the standard deviation. Based on the data of learning outcomes between the experimental class and the control class, the experimental class mean score was higher that was 78.00 than the control class mean score that was 71.00 with a difference of 6.00.

Normality test was calculated by Kolmogorov-Smirnov test with SPSS 16. The learning outcomes of the experimental class and the control class had sig. values > $\alpha = 0.05$ so H0 was accepted. The data was presented in the following table:

Result	**Class**	**Critical Thinking**	**Kolmogorov-Smirnov**			**Conclusion**
			Statistic	**df**	**Sig.**	
Learning Outcomes	Experiment	High	0.566	7	0.906	Data was normally distributed
		Low	0.714	7	0.688	Data was normally distributed
	Control	High	0.638	7	0.810	Data was normally distributed
		Low	0.580	7	0.890	Data was normally distributed

Table 2: Normality Test Results

The variance homogeneity test using the Bartlet test with SPSS 16 at a significance level of $0.393 > \alpha = 0.05$, which meant that H0 was accepted, and the learning outcomes of the experimental class and the control class came from homogeneous variance.

After the data met the normality and homogeneity prerequisite test, the process continued to the hypothesis test by using ANOVA test with SPSS 16. The first hypothesis test was the test of students' learning outcomes using ethnosains and scientific approach obtained the significance of $0.033 < \alpha = 0.05$, so H0 was rejected and H1 was accepted which meant there was and was an effect of the ethnoscience approach and scientific approach toward students learning outcomes. This showed that H1 was accepted, which meant that there was a significant effect of the ethnoscience approach and the scientific approach toward students learning outcomes.

The second hypothesis test was the test of critical thinking ability toward learning outcomes, it was obtained a significance value of $0.617 > \alpha = 0.05$, so accept H0 was accepted and H1 was rejected which meant there was and was no effect of critical thinking ability toward students learning outcomes. This showed that H0 was accepted, which meant that there was no significant effect of critical thinking ability toward students learning outcomes.

The third hypothesis test was the test in order to see the interaction between learning approach and critical thinking ability toward learning outcomes. The results obtained the significance value of the hypothesis test of $0.877 > \alpha = 0.05$, so H0 was accepted and H1 was rejected which meant there was and was no interaction between learning approach and critical thinking ability toward students learning outcomes. This showed that H0 was accepted, which meant that there was no interaction between ethnoscience approach and critical thinking ability students learning outcomes.

3.1. Students Learning Outcomes Who Used The Ethnoscience And Scientific Approach.

The result of data analysis showed that there was an effect in the learning with the ethnoscience and scientific approach. The research conducted by Atmojo (2012) mentioned that an ethnoscience approach carried out by transforming between original science (culture) and scientific science by guiding students to find and build their own knowledge.

According to Ine (2015), the scientific approach was a learning approach in which students were invited to carry out the process of finding knowledge regarding with subject matter through various scientific process activities as carried out by scientists in conducting scientific investigations which means students were directed to find various facts, constructing concepts, and new values needed for his life by themselves.

Both applied learning approaches indicated better results for the students, which made students become more active and able to express their scientific abilities well.

3.2. The Effect of Critical Thinking Ability toward Learning Outcomes.

One of the variables examined in this study was the critical thinking ability toward learning outcomes. The test results showed that the critical thinking ability had no effect toward learning outcomes. According to Rosnawati (2012), critical thinking ability was not automatically owned by the students, this could only be obtained by guided training and students were not only as a medium of knowledge transfer from the teacher. Through critical thinking ability, the students participation was actively invited to find answers to each problem and build their own knowledge.

3.3. The Interaction between Learning Activities and Critical Thinking Ability.

The results of this study did not support the results of research conducted by Mahanal (2012) which stated that in his research increasing the critical thinking ability would lead to better learning outcomes, because the learning process designed by the teacher could help and stimulate children to be actively involved so that their abilities increased.

Both of the two results of the ethnoscience and scientific research mentioned above showed that the stages of learning process were almost the same. This could be a support that there was no interaction between the two learning approaches applied. The condition of the experimental and control classes that had the same ability in applying critical thinking ability in the previous learning, made no significant difference between high and low critical thinking groups.

Previous research conducted by James (2006), stated that a culture-based approach did not have a high significance value in influencing student interest toward science lessons.

Based on a series of learning carried out both ethno science and scientific approaches, showed that the process could train and improve students' critical thinking ability, students were directly involved and the teacher became a mentor in the teaching and learning process. Finally, the students had the ability to construct knowledge based on their daily life and experiences so that learning became fun and meaningful for students, and ultimately increased learning outcomes.

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