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Application of Contextual Learning to Improve Critical Thinking Ability of Students in Biology Teaching and Learning Strategies Class

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Abstract: This study is aimed to improve students' critical thinking skills through the application of contextual learning in Biology Teaching and Learning Strategies Course. Classroom Action Research was conducted in Biology Education Study Program of State University of Medan. The subjects were 60 Biology Education students, which were determined by purposive sampling. Critical thinking skills data was obtained through the analysis of student questions during students' journal presentation. The data were also collected through observation and documentation of student journals which then analyzed based on its percentage. The results showed that there was a 18.5% increase in the critical thinking skills from the first to the second cycle after applying contextual learning in Biology Teaching and Learning Strategies course.

Keywords: Contextual Approach, Critical Thinking, Journal Learning, Question.

Introduction

Biology Teaching and Learning Strategies, weighs as many as three credits, is one of the courses included in Biology educational field study. This course is taught to biology education students' in the fifth semester. By attending this course, students prepare themselves with a preliminary understanding, that can be used when they attend Biology Lesson Planning, Micro Teaching, Evaluation Process and Biology Learning Outcomes and Research Methods in Biology Education courses in the future. These courses are aimed to construct student competence as biology teacher candidates, and can be taken by students following the fifth semester. According to Hall, et all (2008), teaching is a professional job, so the pre-services teacher, taking class in educational training program, need to prepare themselves better with regard to learning the ins and outs.

Course Content and Learning Strategies of this subject concerns about the philosophy of learning, learning theories, strategies, approaches, methods, models, learning styles, media, teaching materials, and teaching aids in biology learning. Lecture methods are currently running on commonly used methods such as lectures, discussions, paper assignments, and the search for learning resources via internet. The data showed that learning outcomes of students in this course were generally still considered mediocre, in which on the average, were categorized into grade C (68.45%), followed by B (19.58%), with the rest (1.12%) earned an A, after taking this course. This data is important because Ginnis (2007) suggests that acquisition of such values can be used as feedback in the learning process to improve learning approach in the future.

Students were observed to possess negative behavior that considered unproductive for their improvement during this course, such as inability to promote questions during learning process, less creative work, followed with less demonstration of critical thinking skills. Results of quiz distribution during meetings to see the acquisition of skills in one or two basic competencies, showed that students do not obtain satisfactory results. In general, average obtained quiz score, from a maximum of 100 the acquisition value is only 68 or still are under 70. It is believed that with one or two numbers of lecture material repetitions, then the students can be expected to improve their critical thinking skills.

If this is allowed to continue, otherwise, there will be the barriers in terms of time use in repeating the subject matter, as experienced by researchers. Thus, it is necessary to study an innovation by making students become more active in learning. In contextual learning theory, students are in the learning process or usually called learning by doing. Students just not merely receive materials from the professors, but the students, through learning by doing are able to master the subject matter well and can apply it in everyday life.

Biology Teaching and Learning Strategies need to be turned to the foundation of contextual learning in which students actively construct their own knowledge, able to think critically and have the independence in learning. In addition, students need to have the life skills and ability to work together, the ability to communicate, the ability to be a diligent learner, and able to take the right decisions in solving real life problems. Therefore, in Biology Teaching and Learning class there is a need to study on an appropriate innovative approach. Smith (2010) said that Contextual Teaching and Learning in a conception of teaching and learning helps teachers relate the content of subject matter to real world situations. On the other hand, CTL defined the concepts as an innovative instructional process that help students connect the content they have learned to the life context in with that content colud be used. Hutson (2011) said that CTL is defined as a way to introduce content using a variety of active learning techniques, designed to help students conduct what they already know to what they are expected to learn and to construct new knowledge from the analysis and synthesis of this learning process.

In the case of Biology Teaching and Learning Strategies course, it is still not much to change the way students learn form the semester of the previous academic year. Therefore, it is necessary to conduct an innovative approach the quality of this lecture, by applying contextual learning, and practicing various teaching methods such as problem-solving methods, guided discovery, field trips, simulations of active learning, critiquing various learning models that are presented in the form of animation, critical analysis, and student journal reading. Wishler (2013) explained that contextual learning is an active learning design which provides a way to introduce the learning content with the variation of active learning to help students connect with their learning world.

The importance of the application of contextual learning in studying Biology Teaching and Learning Strategy is that the student is given with material that has been long studied. Contextual approach will be basically improve student learning. In this case, students become an active participants through the learning process. Lecturer acts as a facilitator that enables students to optimize their learning ability. Indeed, this approach is not a new approach, since the introduction by John Dewey in 1916. For biology education students who would be a teacher, the learning is not enough to simply memorize the material. Furthermore, students are invited to practice learning by doing. It is expected through the course, students' critical thinking skills can be improved. According to Harrell (2004) philosophers generally agree that one aspect of critical thinking is the ability to analyze, understand, and evaluate an argument. Critical thinking skills are deemed important because they enable students in dealing effectively with social, scientific, and practical problems (Shakirova, 2007). Simply put, as explained by Snyder and Snyder (2008), students who are able tothink critically are able to solve problems effectively, because merely having knowledge or information is not enough. To be effective in the work place students must be able to solve problems to make effective decisions; thus, theymust be able to think critically.

Critical thinking is defined as the process of decision-making that encourages self-regulation aimed at solving problems and making the right decision or the "engine" that drives how to decide what to do or believe in a certain context. Critical thinking includes behavioral tendencies (eg, curiosity, open-mindedness) and the skills of analysis, conclusions, and evaluation. This study aims to answer how much improvement students' critical thinking skills by applying contextual learning in Biology Teaching and Learning Strategies course.

Methods

The present Classroom Action Research was conducted in Biology Education program, State University of Medan. The execution time was for one semester or six months. The subjects of interest were 60 Biology Education students. Subjects were determined by purposive sampling. The entire subject of research consist of 11 male students, with the rest 49 female. Students enrolled in this study actually counted as many as 51 students, but there were the additional 9 students which we transferred from non-educational biology program.

The study design was a classroom action research. This classroom action research was developed based on the findings earlier lectures it is expected that after attending Biology Teaching and Learning Strategies course, students can improve the quality of their thinking. The steps of study consisted of two cycles. Research cycle is determined based on the basic competencies that were taught in the Biology Teaching and Learning Strategies course.

Cycle I:
The first cycle was consisted of Planning Phase, Actions Phase, and Observation/ Evaluation, Phase and Reflection Phase.
Planning stage included: reviewing, analyzing, and developing course materials of Biology Teaching and Learning Strategies.
Action Phase: Simulating the lecture material by giving problems in soft-copied form to be discussed by students in cooperative group work Learning. Students also perform critical analytical study of impressions, delivered during the learning. Students also do a critical analysis of the source books (literature), and write student learning journal individual.
Observation/Evaluation Phase: the phase took place on the course meetings and was done by an observer from members of the research team. All questions and activities of student learning were recorded through observation sheet.
Reflection Phase: Measuring the achievement of the learning process and products such as critical thinking skills. Based on the results of the first cycle of this reflection the process can be continued to Cycle II.

Cycle II:
In the second cycle, the phase included performed Planning Phase, Actions Phase, and Observation/Evaluation Phase, and Reflection Phase.
Planning Phase of this cycle consist of review, analyze, and action on the results of the first cycle of reflection into the course design when the problem was encountered by the students. Students pose a problem which is obtained from the internet, and textbooks. The issues raised during this term are ranged from Biology Teaching and Learning Strategies course materials that they deem to be solved.

Action Phase: Simulate the problem of student learning and the solution was made or done together in groups of cooperative Learning. Students also perform critical analysis of source book and student journal writing, each was done in a separate notebook.

Observation/Evaluation Phase: The phase took place when observations by two observers from members of the research team was done. All questions and learning activities of students were recorded at the end of the second cycle.
Reflection Phase: Measuring the achievement of the learning process and products such as students critical thinking skill. Lecturers also corrected student journal as part of the reflection. The results obtained at this stage of reflection would be used as a reference in planning the next cycle (cycle III) but if there is a significant increase in research, the process would be halted in the second cycle.

Findings

The data of this study were obtained form critical thinking skills and social proficiency. Other supporting data is in the form of students activity in asking questions. Critical thinking skills is analyzed through the examination of student questions during presentation. Social proficiency were analyzed from a distributed questionnaire. Data were collected through the observation and questionnaire analysis using percentage techniques. The data collection and analysis of data in the first cycle and the second cycle obtained as follows in Table 1.

Table 1: Critical Thinking Ability

No.	Range	Value Category	Cycle I		Cycle II	
			F	%	F	%
1.	90-100	Exellent	6	10.0	14	23.3
2.	80-89	Good	25	41.7	28	46.7
3.	70-79	Moderate	28	46.7	18	30.0
4.	< 70	Not Critical	1	1.6	0	0

Table 1 shows that there is an increase in the critical thinking skills of students in Biology Teaching and Learning Strategies course with the application of contextual approach.

Result and Discussion

Critical thinking skills of students in Biology Teaching and Learning Strategies course can be enhanced by applying contextual learning. Students' critical thinking skills can be improved for logical reasons that the introduction of a contextual approach in directing students into realistics thinking according to real life conditions. Various theories of learning is that learned can be implemented on lecture material. This makes it a challenge for students in applying it to everyday life. Subject matter becomes more meaningful for students with application of problem solving and through the process of inquiry and cooperative group work. This makes the students, becoming more diligently to asked question during the group presentation. The average student questions counted as much as 5 questions, making students become more motivated to learn. This is in line with the opinions of Wishler (2013) declaring the interaction in the learning process, in which students will be challenged and motivated in their learning. Besides that, students were trained to think in an advanced organization, this is also in line with Shihusa and Keraro (2009) which states that student motivation were higher after applying advanced thinking organizer. Smith (2010) said that the subject matter can be delivered using the CTL pedagogical model while also build critical and problems solving skills.

Contextual learning provide a stimulus to the brain for processing materials meaningfully. In this case, students gain an advantage in applying the material

in the context of their daily lives as part of the family and community members . Students in this case are not only able to master the concepts well, but further, that they can explore the material better. They can do this because they are involved in the learning process directly, explain the materials, tell it, or even deduce what they serve. This is in line with the view of Johnson (2002) which states that the student will be able to explain in broad and deep subject matter by applying the contextual approach.

Students in this learning activity do not just memorize Biology Teaching and Learning Strategies concepts, but can also appreciate the subject matter well. Through this contextual learning, students will be able to demonstrate their ability in classroom discussions. They will increase the vocabulary knowledge of the various sources of relevant literature, or from their previous experience. Thus, the students will try to connect concepts they had obtained previously with what they learned that day, accommodating unique learning they have. Prashing (2004) states that everyone has indeed a unique style of learning, thinking, and working.

Students not only receive course materials based on what the lecturer said, but constructs the subject matter from time to time in his mind. In view of this, students build and create knowledge by trying to give meaning to his knowledge according to his experience. Ginnis (2007) states that constructivism is the process of building or construct new knowledge in the cognitive structure of students based on experience.

Critical thinking skills include solving problems, making decisions, and separate opinions with facts on science. Through contextual learning, students can criticize biology learning problems in school. The improvement of students' critical thinking skills through the application of contextual learning can be understood as the students will be active in finding a variety of learning resources. Students social ability will be encouraged through inquiry, cooperating, and cooperative group work. The use of various multi-method allows students to be active in the learning process. This is in line with Hall and Kidman (2004) which states that contextual learning make the atmosphere becomes centered on student learning and faculty can develop the ability.

Students are trained to be a critical thinker to all courses when contextual learning is applied. This is in line with the opinion of Fisher (2009) which that the ability to think criticallis described as an active process that involves the role, played by the metacognitive thinking about thinking itself. Students become more creative in thinking.

Through contextual application, students are allowed to communicate and share ideas while experiences and work together to solve problems. In a community learning activities or learning community by Suryawati (2010), students work better in group than working individually. Besides that, students' softskill will also be formed through the learning activity. Learning community create conditions that allow one student to learn with other students. Some examples of

soft skills can be formed through this learning activity, according to Smith (2010), namely: (1) There is a sense of responsibility and cooperation between members of the group to give and take; (2) There is a willingness to accept the opinions of others; (3) There is a willingness to respect the opinions of others; and (4) There is a sense of responsibility of the group, all members of the group have the same responsibility.

Through contextual learning, students have increased activity in learning. They in turn become a speaker in front of the class presenting lecture material. At the time of question and answer, many students were observed to actively raised their hands to promote question. Classroom atmosphere become more alive. Although teaching process are in the middle of the day students still look excited. In fact, often times be increased because it is still fun to student to conduct a question and answer session through the dialogue. Along with that, students were seen to possess thehabit in conducting a social inquiry. This is in line with Zumdani (2014) explanation that in the social inquiry, students can collaborate and be more successful in achieving their academic achievement.

Students have asked qualified questions when debriefing process takes place. Students promoting question activities were better in the second cycle; with so many questions asked by students in the learning process. This showed that they really enjoy learning. Using questioning techniques that improve student learning, the development of problem solving, and higher-order thinking skills (Suryawati, 2010) can be achieved. Students were more likely to be able to develop the scientific ability, which is in line with the opinions by Balaney (2013) that with student centered approach, students can significantly improve critical thinking skills.

Promoting questioning in learning is seen on the lecture activities to encourage, guide, and assess the student's ability to think (Suryawati, 2010). Smith (2010) states that in a productive learning, activities asked to: (1) Digging information, both administrative and academic; (2) Check for student understanding; (3) Generating a response to the student; (4) Knowing the extent of the student 's curiosity; (5) Knowing the things that have already known to the students; (6) Focusing attention on a desired student lecture; (7) To raise more questions from students; and (8) to refresh students knowledge. Haynes (2003) and Bailey (2003) emphasized the importance of asking the right questions for students to stimulate critical thinking skills, while Hemming (2000) explained the focus on integrating questioning techniques into class discussions to support an educational environment is important where students can demonstrate and practice critical thinking skills.

Conclution

Based on the results and discussion of research it can be concluded that students' critical thinking skills was improved by 18.5% after applying contextual learning in Biology Teaching and Learning Strategies course.

References

Balaney, C.A.(2013). Assessment on student's science process skills: A student sentered approach. International Journal of Biology Education. 3(1), 52-60.

Fisher, A. (2009). Critical thinking: A conductor. Jakarta: Erland.

Ginnis, P. (2007). Teacher's, toolkit, raise classroom cchievement with strategies for every leaner. California: Corwin Press.

Haynes, T., & Bailey, G. (2003). Are you and your basic business students asking the right questions? Business Education Forum, 57(3), 33–39.

Hemming, H.E. (2000). Encouraging critical thinking: "But…what does that mean?" Journal of Education, 35(2), 173-182.

Johnson, E.B. (2002). Contextual teaching and learning: making teaching and learning activities exciting and meaningful. Bandung: Mizan Learning Center.

Hall, C & Kidman. J. (2004). Teaching and learning: mapping the contextual influences. International Education Journal. 5 (3), 332-342.

Hall, G.E., Quinn, L.F., & Gollnick, D.M. (2008). The joy of teaching making a difference in student leaning. USA: Pearson Education, Inc.

Harrell, M. (2004). The improvement of critical thinking skills in what philosophy is (Tech.Rep.No.CMU-PHIL-158). Pittsburgh, PA: Carnegie Mellon University, Department of Philosophy.

Hutson, C.C. (2011). Contextual teaching and learning for practioners. Systemics, Cybernetics and Informatics. 6(4), 54-58.

Prashing, B. (2004). New ways of learning and teaching learning styles. New Zealand: Network Educational Press Ltd.

Suryawati, E., Osman, K.., & Subahan. (2010). The effectiveness of rangka contextual teaching and learning on students problem solving skills and scientific attitude. Journal of Social and Behavioral Sciences. 9(4), 171-182.

Shakirova, D.M. (2007). Technology for the shaping of colleges students' and upper-grade students' critical thinking. Russian Education & Society, 49(9), 42–52.

Shihusa, H. & Keraro, F.N. (2009). Using advance organizers to enhance students' motivation in learning biology. Eurasia Journal of Mathematics, Science and Technology Education. 5(4), 413-420.

Smith, B.P. (2010). Instructional strategies in family and consumer sciences: Implementing the contextual teaching and learning pedagogical model. Journal of Family and Consumer Science Education. 28(1): 23-38.

Snyder, L.G & Snyder, M. (2008). Teaching critical thinking and problem solving skills. The Delta Pi Epsilon Journal, 5(2), 90-99.

Wishler, V.R. (2013). Contextual teaching and learning for practioner. Educational Journal. 6(4), 161-172.

Zumdani, S. 2014. Inquiry based learning. USA: Cengage Learning.