Socioscientific Issues-Based Learning as an Effort to Train High Order Thinking Skills in Junior High School Students

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The development of Science and Technology has a positive and negative impact. The negative impact caused by the development of science and technology shows that education is faced with the challenge of producing graduates who can solve problems. Meanwhile, on the other hand, it is known that the scientific literacy skills of students in Indonesia are still low. The socioscientific issue is an important element that needs to be presented in science and technology learning activities. The purpose of the article is to describe the application of socioscientific issues-based learning as an effort to train high order thinking skills in junior high school students. This article is a literature study where related articles are reviewed and the information obtained is compiled into writing. it can conclude if socioscientific issue-based learning can be used as an effort to improve high order thinking skill for junior high school's student.

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1. INTRODUCTION

The development of Science and Technology (Science and Technology) has given positive and negative impacts. The negative impact caused by the development of science and technology shows that education is being challenged to produce graduates who can solve problems. The provision of human resources capable of critical thinking is one of the important agenda (Bustami,2017) and a hot issue addressed in modern education. Improving the quality of education, especially science learning, still continue to be pursued because of the belief that science as a basic science plays an important role in the development of science and technology.

Data PISA (Program for International Student Assessment) demonstrates the ability of science literacy learners Indonesia is still below average when compared with the average score of the other participating countries (Toharudin, Hendrawati, & Rustaman, 2011). Excerpted from The Organization for Economic Cooperation and Development (OECD) ranks Indonesia in PISA in 2009 which is the 57th of 65 with the acquisition of a score of 383.

In the year 2012 Indonesia was ranked 64th out of 65 countries with a score of 382. Further acquisition in 2015 Indonesia was ranked 64th of 72 countries participated in the acquisition score is 403. scores achieved scientific literacy ability of Indonesian students were still below a score of international standards set by the OECD (OECD, 2010; Pisa, 2012; Gurria, 2016).

Critical thinking is a high-level thinking skills that can be developed through the learning of science (Zubaidah, 2010). Critical thinking is part of the thinking patterns of complex or high level that is convergent and uses cornerstone thinking process to analyze the arguments and raise the idea of the individual meaning and interpretation, to develop a pattern of reasoning that is cohesive and coherent, understand the assumptions and biases underlying each position, as well as giving a presentation model that can be trusted, be concise, and convincing (Rahayu, 2015).

High-level thinking skills can be practiced with the inclusion of socioscientific in learning activities. Compelling reasons to engage in science learning

sosiosaintifik study is that the study socioscientific enable students to make decisions on issues that develop in real life that is based on science (Nielsen, 2012). Activity socioscientific -issue based learning centered on empowering students to consider how science-based issues can reflect moral principles and elements of virtue in the lives of students, as well as the physical world and the social environment of the students (Zeidler et al., 2005). Implementation issues socioscientific in learning activities capable of realizing students can appreciate the nature of science and apply science in everyday life (Bodzin, Klein, & Starlin, 2010). Meanwhile, the results of previous studies conducted by Balgopal and Wallace (2013) showed that upper school students who are active in the learning associated with the issue socioscientific have the capability of higher science literacy.

The purpose of writing this article is to describe the application of socioscientific issues-based learning as an effort to train high order thinking skills in junior high school students. In addition, this paper also aims to encourage junior high school science teachers to utilize socioscientific-issues in learning activities.

2. RESEARCH METHODS

The writing method is literature. Related articles on the socioscientific-issue and high-level thinking skills are collected and assessed. Information obtained from the article subsequently compiled into an article. The article contain a analysis of a sociosaintific issue-based learning as an effort to train high order thinking skill for Junior High School's student.

3. RESULTS AND DISCUSSION
a. Sosioscientific-issues

Some educators have called for discussion of social issues in the curriculum of science-fiction because of its potential to create learning activities more real, the human image of scientific activity and to promote scientific literacy, an important tool for decision-citizenship about responsibility making processes related to the issues of social-scientific (Kolsto,2001). Everyone stressed the need for the social effects of media in schools to promote discussion of the issues socioscientific and discussion of students' conceptions of the interaction between science, technology and society. Conception is the basic foundation of thinking and acting, providing the means to see the world and organize concepts (Reis, 2009).

Socioscientific -issue is becoming increasingly important in the field of science education because it can serve as a tool to: (a) make science learning more relevant to student's lives; (B) a vehicle that directs the learning outcomes such as the appreciation of the nature of science; (C) increase the argument dialogue; (D) improve the ability to evaluate scientific information; and (e) include important aspects of scientific literacy (Sadler & Zeidler, 2004). Socioscientific issues inspire, provoke, or otherwise to convert insight. These issues are often found at the frontier of science (science in the making) potential of the animals, energy, and land use genetics and reproductive technologies.

Socioscientific -issues usually involve experts thought and debate on the major scientific questions that does not have a simple and clear solution (Kolstø et al., 2006). The controversy that do not have simple solutions that provoke the involvement of the student's mind is unique socioscientific-issue for the provocation could not appear in lectures or speeches. Justification in using sosioscientific-issue, described by Zeidler et al. (2009), established the theoretical framework of developmental psychology, sociology and philosophy. Students acquire knowledge in the classroom can be with or without socioscientific-issue, but the sosioscientific-issue unique in that socioscientific-issue can manage a wide range of learning outcomes (eg scientific literacy, the nature of science that called unification power) (Zeidler et al., 2009).

By encouraging the involvement of a large student through relevant social problems stemming from disciplines, sosioscientific-issue has shown its potential to minimize classroom management issues and provide troubleshooting and science content acquisition opportunities (Sampson, Groom, & Walker, 2011). Moreover, the issue of sosioscientific moral can develop students through an exploration of social issues and personal use that perspective. Thus, it will create a more meaningful learning (Zeidler & Keefer, 2003). If it is associated with moral issues in the process of consideration for the decisions or actions, students naturally be felt to have such problems and an atmosphere like this is rarely practiced in schools.

Problems socioscientific -issue incorporate components from a moral and ethical science topics are conducted through discussion and interaction students about controversial issues aims to reduce or solve these issues. Therefore, the issue is open sosioscientific that allows students to think critically about these issues along with others who have a different view (Zeidler and Sadler, 2008). Movement socioscientific issue focuses on how students understand the issues and make decisions, and the decisions they make on those issues relating to morality and ethics. Some examples of problems that can be categorized socioscientific-issues, for example the issue of global warming (global warming), environmental pollution, nuclear applications, and so on. Thus, by utilizing this socioscientific social issues must begin to be discussed and disseminated mainly in schools.

b. Critical Thinking Skills as part of the High-Level Thinking

Thinking is an activity that involves manipulating and changing the information in the memory. At the time of thinking, we are thinking of forming a concept, judgment, critical thinking, decision making, creative thinking and determine the solution of a problem. Critical thinking is reasonable and reflective thinking that is focused on deciding what to believe and what to do. This means that when using critical thinking will be able to decide exactly what to believe and what to do. Critical thinking is an intellectual process and the full concept of skills among other things (1) apply; (2) analyzes; (3) synthesizing; (4) evaluate where the information was obtained; (5) or to generalize the results of the process of observation, experience, reflection, reasoning,

According to Ben-Chaim, Ron & Zoller (2000), Critical thinking is the core of the future of all communities in the world. It is widely acknowledged that develop critical thinking skills is an important goal, especially in science education. This can be found for example in the National Science Education Standards that one of the objectives in encouraging science as inquiry. Those goals are translated into some of the things that lead to ability and critical thinking skills. In connection with critical thinking skills, Walker (2005) states that critical thinking skills are process that allows learners to gain new knowledge through the process of problem solving and collaboration. Critical thinking skills to focus on the learning process rather than just the acquisition of knowledge. Critical thinking skills are important in the learning process because these skills provide opportunities for students to learn through discovery. Critical thinking skills are at the heart of the future of all societies around the world (Redhana, 2012).

In general, according to Ennis (1993) critical thinking is reasonable reflective thinking focused on Deciding what to believe or do." Namely, a reasonable reflective thinking focused on deciding what people believe or do. In the decision-making process is often done following processes: assessing the credibility of the source; identify conclusions, reason, and assumptions; assess the quality of the arguments, including the acceptance of the reasons, assumptions and evidence; develop and maintain a position in an issue of the problem; putting the question to clarify; planning and reviewing experiments designed an experiment; define the term in a way that is suitable to the context; being open; try to understand well;

Critical thinking is part of a complex thought patterns/high level which is convergent and uses cornerstone thinking process to analyze the arguments and raise the idea of the individual meanings and interpretations, to develop a cohesive pattern and logical reasoning, understanding the underlying assumptions and usually each position, as well as providing a model presentation that is reliable, concise and convincing. Facione (2013) stated that the essence of critical thinking is the detailed description of a number of interrelated characteristics, which include: interpretation skills, skills of analysis, inference skills, skills evaluation, explanatory skills, and self-regulation skills.

c. Implementation Issues Based Learning Sosiosaintifik

Here is an example of learning that can be set based on socio-scientific issues additives for science subjects at secondary school (SMP) as presented in Table 1.

Table 1. Compiled Learning Activity Based Socio-scientific Issue of Additives in Food

Basic competencies	Subject matter	Principal Submateri	Learning

Explains a variety of additives in food and beverages, addictive substances, as well as their impact on health	Additives and addictive	a. Type of additive (natural and artificial) in food and drink
		b. Effect of additives on health
			1. Dividing students into 5 groups
			2. Each group was observed in the neighborhood of foodstuffs that contain natural and artificial additives
			3. Each group looking for news misuse of additives in foodstuffs :
			  a. The use of borax as pengenyal meatballs
			  b. The use of formaldehyde as a preservative anchovies
			  c. The use of formaldehyde as a preservative fish out
			  d. The use of dye Rhodamine B in food
			  e. The use methanil yellow dye in food

Basic competencies	Subject matter	Principal Submateri	Learning

			4. Each group examines the causes of the abuse of additives in foodstuffs
			5. Each group examines the negative impact of the abuse of additives in foodstuffs
			6. Each group examines additives that can be used in foodstuffs :
			  a. The use of carrageenan as rubbery for meatballs
			  b. The use of chitosan as a preservative anchovies and know
			  c. The use of natural dyes such as beets, strawberries, dragon fruit, roselle for red, while yellow can use turmeric, pumpkin, and manga

The learning activities as shown in Table 1 are expected student responds to a manipulation of additives in foodstuffs. In addition, the inclusion of issues such socioscientific encourage students to submit arguments against this form of abuse of additives as well as finding a solution by suggesting natural additive materials that can be used for processing foodstuffs. Socioscientific assessment can enable students to make decisions based on deviations from the use of additives in food that is based on science. Thus, learning activities are arranged able to hone high-level thinking skills of students and to apply science in everyday life.

4. CONCLUSIONS AND RECOMMENDATIONS

Learning science in the classroom must provide the opportunity for students to develop critical thinking skills that are part of high-level thinking skills. High-level thinking skills need to be practiced by utilizing socioscientific -issues in learning activities. One socioscientific-issue that can be associated with the subject matter, namely junior high science of additive substances abuse in foodstuffs. Through the learning activities that have been prepared, students are encouraged to submit arguments against the abuse of additives as well as assessing the negative effect on health. Students are also trained to think to seek solutions to problems of abuse of additives to suggest some kind of natural additives that are safe for health. So thus, based on socioscientific issue-based learning of additive substances abuse in foodstuffs, it can conclude if socioscientific issue-based learning can be used as an effort to improve high order thinking skill for junior high school's student.

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