



Analysis of Critical Thinking Skills High School Students in the District of Semarang Material Environmental Change Curriculum 2013

Rizki Setianingsih¹, Aditya Marianti^{1✉}, Sri Ngabekti²

Biology Department, FMIPA, Universitas Negeri Semarang, Indonesia

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Abstract

Learning science at school is expected to develop critical thinking skills students for the challenges of the 21st century. Critical thinking skills are integrated into the curriculum of 2013. The ability of high scientific literacy shows high critical thinking skills. This study aimed to analyze the level of critical thinking skills of high school students in the District of Semarang on environmental changes material of curriculum 2013. This study was a descriptive quantitative survey method using a questionnaire and observation sheet. The research was conducted in three high schools in Semarang District selected by purposive sampling in SMAN 1 Ungaran, SMAN 1 Bergas, and SMA Islam Sudirman Ambarawa. Respondents used is class X IPA as many as 195 students in three schools. The data were analyzed using R software. Based on the results of research, critical thinking skills of students only in the quite critical category. Kruskal-Wallis test results of chi-square showed a difference in the level of critical thinking skills of students at SMAN 1 Ungaran, SMAN 1 Bergas and SMA Islam Sudirman Ambarawa with significant value 0.000009439. The highest level of high schools students critical thinking skills based on average indicators of critical thinking is SMAN 1 Ungaran with a percentage of 58%. The percentage of students' critical thinking skills in SMAN 1 Bergas and SMA Islam Sudirman Ambarawa is 57% and 55%. Critical thinking skills of students at SMAN 1 Ungaran, SMAN 1 Bergas and SMA Islam Sudirman Ambarawa included in the quite critical category. The proportion of students at the level of critical thinking skills in SMAN 1 Ungaran, SMAN 1 Bergas and SMA Islam Sudirman Ambarawa are different. The questionnaire results and students' test results showed linkage relationships based on Pearson correlation analysis chi-square obtained 42.199 squared counts > squared table with significant value 0.000000168.

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✉ Correspondence:

D6 Building 1st Floor Jl Raya Semarang sekaran Gunungpati
E-mail: aditya.marianti.am@mail.unnes.ac.id

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INTRODUCTION

Science and technology are growing rapidly in the 21st century. Learning in high schools are expected to develop critical thinking skills of students in order to face the challenges of the century. Critical thinking skills needed to support careers so that it can compete globally and is able to solve existing problems in the neighborhood.

Critical thinking skill is the individual ability to give an opinion, analyze, understand, scientific and creative thinking, as well as assess and make decisions accurately (Sarigoz, 2012), According to Zivkovic (2016), someone who has the critical thinking skill is able to communicate effectively, evaluate, distinguish, and determine whether the idea is right or wrong, as well as finding a solution to solve a problem (Mabruroh & Suhandi, 2017). The capability is integrated into the 2013 curriculum.

Forms of integration in the curriculum listed in the Basic Competency (KD) 3.11 and 4.11. The 3.11 basic competence is to analyze the data of environmental changes, causes, and impact on the lives. The 4.11 basic competence is to formulate the idea of the problem-solving environmental changes that occur in the environment. Curriculum 2013 is developed by perfecting the mindset of student-centered learning, interactive learning using a scientific approach by utilizing various resources or learning resources (Kemendikbud, 2014). This is done so that learning according to the characteristics of students so that the objectives of the 2013 curriculum reached.

Implementation of the 2013 curriculum is expected to improve students' critical thinking skills. Facts on the ground show there is some obstacles to curriculum implementation in schools. Siskandar's study (2016) mentions that there was a wrong perception of the new curriculum, teachers have problems in preparing lesson plans, and obstacles in school management. According to Arista *et al* (2015) teachers have difficulty assessing and on learning the discourse method are dominant in use.

Critical thinking skills related to the ability of science literacy. High science literacy skills show high critical thinking skills. Based on the PISA's study in 2015, science literacy of students in Indonesia is still low. Therefore, it should be assumed that the critical thinking skills are low, so the students' critical thinking skill analyzes is needed, especially on environmental changes materials in high school at Semarang District.

Some of the innovative learning models can improve the critical thinking skill, there are Group Investigation (GI), Advanced Organizer, Problem Based Instruction, Problem Based Learning with etnosains, Jucama models, Inquiry-based Learning and Cooperative Learning. The study of Miraningsih & Azizah (2015) mention that the models GI improve students' critical thinking skills through group work with individual responsibility. Critical thinking skills also improved through the Problem Based Instruction model by presenting the issue at the beginning of learning so that students investigate and find a solution to solve problems (Afrizon *et al*, 2012),

The study of Nezami *et al* (2013) show that the Cooperative Learning model improves students' critical thinking skills in problem-solving, social interaction, look for a variety of reference sources of learning and looking at the problem from a different perspective. According to Qing *et al* (2010) learning to train critical thinking skills of students have the characteristic train students to predict. Sulistiono *et al* (2014) also mention the characteristics of learning that can improve critical thinking skills among others to observe, analyze arguments, exploration, summed up, communicate, and evaluate and solve problems. According to Alvitasari *et al*.

(2016), student learning outcomes can be optimized through *Jelajah Alam Sekitar* (JAS) learning approach. This approach can also improve students' critical thinking skills.

Critical thinking skills need to be developed in learning, one of which is biology learning. Biology is part of natural sciences that have scientific characteristics through observation, experimentation, and analysis that are rational. The characteristics of biology learning are: (1) students engaged in learning activities; (2) students are required to think scientifically; (3) students construct concepts, principles, and generalizations; (4) the students helped to understand the limitations of science, values, and attitudes that can be developed to take decisions (Putra, 2013).

One of the biological material in the 2013 curriculum that requires students to think critically is an environmental change material. The material consists of two Competency (KD), KD 3.11 is analyzed data of environmental change, causes, and impact on the lives, therefore KD 4.11 formulate ideas to solve environmental changes problem that occurred in the environment (Kemendikbud, 2016),

Critical thinking skills are divided into five aspects by Ennis (2011): provides a simple explanation, build basic skills, make conclusions, give detail explanation, and make conclusions. The aspect consists of 12 indicators, among others: (1) focus on the question; (2) statement analysis; (3) questions and answer about an explanation; (4) to consider whether the information source is reliable or not; (5) observe and consider a report on the observation results; (6) deduce and consider the deduction results; (7) inducing and consider the induction results; (8) to create and determine the outcome of the consideration; (9) define the term and consider a definition; (10) identifying assumptions; (11) determine a course of action; (12) interacts with others.

RESEARCH METHOD

The research was conducted at SMAN 1 Ungaran, SMAN 1 Bergas and SMA Islam Sudirman Ambarawa (Issuda) on April-May 2018. This study is descriptive quantitative research with survey method. The population of this study is all high schools in Semarang district that use 2013 curriculum as many as 10 schools. The sample selection by purposive sampling with rankings consideration of the National Examination (UN) in Semarang district and schools as well as private types. Respondents in this study were 195 students of class X-IPA consisting of 2 classes in each school.

The procedures in this study include (1) preparation; (2) implementation; (3) data analysis. The preparation stage includes the initial observation, instrument preparation of observation sheets, critical thinking skills test questions, and critical thinking skills questionnaire sheet. During the implementation phase do the following things: learning activities observation activities in the classroom and environmental change material evaluation. At the end of the lesson, the critical thinking skills questionnaire are given. The data were analyzed using software version 3.5.1.

Data obtained from the study results percentage with the following formula.

The percentage value test results $= \frac{\text{test score}}{\text{total score}} \times 100\%$. The data were obtained from critical thinking skills questionnaires analyzed by determining the score of each response statement. Based on the results of the percentage of tests and questionnaires, then averaged by the formula:

Percentage of critical thinking skills = $\frac{\text{test result percentage} + \text{questionnaires percentage}}{2}$. The percentage that obtained categorized in Table 1.

The relationship between the result of students critical thinking skills questionnaires and test results were analyzed using the Pearson Chi-square and Pearson Product Moment Correlation formula that helped by R software. The Kruskal-Wallis chi-square analysis is used to determine the differences level of students critical thinking skills of students at SMAN 1 Ungaran, SMAN 1 Bergas, and SMA Islam Sudirman Ambarawa.

Table 1. Percent Category of Critical Thinking Skills.

Interval Scores	Criteria
81% -100%	fastidious
61% -80%	Critical
41% -60%	quite critical
21% -40%	Less critical
1% -20%	uncritically

RESULTS AND DISCUSSION

Based on the analysis of critical thinking skills questionnaires and test results, the average critical thinking skills of students at SMAN 1 Ungaran, SMAN 1 Bergas and Islam Sudirman Ambarawa High School (SMA Issuda) included in the quite critical category. The result showed in Figure 1.

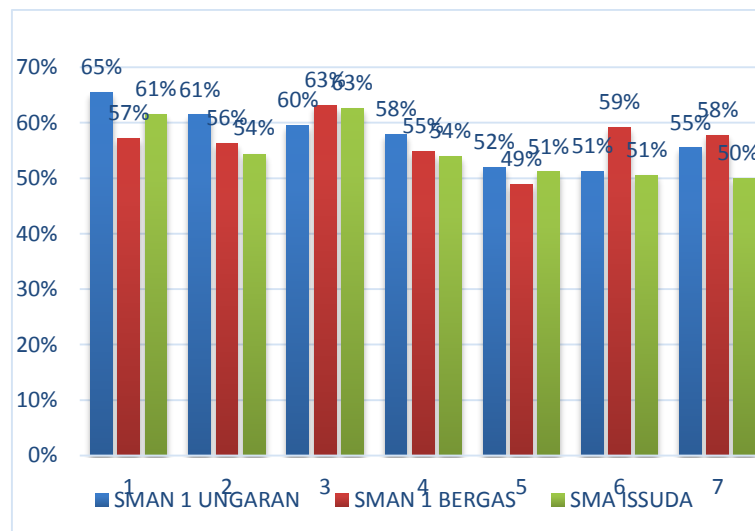


Figure 1. Percentage of Students Critical Thinking Skills

Figure 1 above is a comparison of students' critical thinking skills at SMAN 1 Ungaran, SMAN 1 Bergas and SMA Islam Sudirman Ambarawa based on critical thinking skills indicator. The indicators are: (1) focus on the question; (2) questions and answer about an explanation; (3) observe and consider a report an observation result; (4) induces and consider the induction result; (5) defines the term and consider a definition; (6) determine a course of action; (7) interacts with others.

Based on the Pearson Chi-square and Pearson Product Moment correlation analysis be found a significant relationship between students' questionnaire to the test results as many as 1.9%. and the significance value is 0.05017.

Table 2. Contingency Table of Total Students Based on The Level of Critical Thinking Skills

No.	School	Fulfill Number of Students Critical Thinking Skills Criteria					
		Critical	Percentage	Quite Critical	Percentage	Less Critical	Percentage
1	SMAN 1 Ungaran	28	41%	37	54%	3	4%
2	SMAN 1 Bergas	13	22%	47	78%	0	-
3	SMA Issuda	7	10%	60	90%	0	-

The proportion of students critical thinking skills level in SMAN 1 Ungaran, SMAN 1 Bergas, and SMA Islam Sudirman Ambarawa are different. Based on the Kruskal-Wallis result test obtained significance of 0.000009439. The greatest percentage of students critical thinking skills is SMAN 1 Ungaran compared to the other two high schools.

Critical thinking skills of students at SMAN 1 Ungaran is higher than SMAN 1 Bergas and SMA SMA Issuda in focus on the questions indicator namely 65%. Students at SMAN 1 Ungaran eagerly asked when learning takes place. The questions related to the topic being discussed. While students at SMAN 1 Bergas less enthusiastically asked during a lesson. Students at SMA Issuda enthusiastic to ask when learning, but the question is less relevant to the subject of discussed matter.

The percentage of students critical thinking skills at SMA Issuda on asking and answering questions about explanation indicators is the lowest among to the other two high schools. The percentage is 61% (SMAN 1 Ungaran), 56% (SMAN 1 Bergas), 54% (SMA Islam Sudirman Ambarawa). The students critical thinking skills percentage of SMAN 1 Bergas and SMA Issuda was 54%.

The learning process that takes place at SMAN 1 Ungaran and two other high schools in accordance with the 2013 curriculum. In the learning process, students at SMAN 1 Ungaran able to answer the teacher's questions properly, while students at SMAN 1 Bergas and SMA Islam Sudirman Ambarawa able to answer questions well, but the answer is less right.

A large percentage of the indicator to observe and consider the report of the observation in SMAN 1 Bergas and SMA Islam Sudirman Ambarawa are 63%. The percentage is included in the critical category, while students at SMAN 1 Ungaran including enough category with a percentage of 60%. The percentage of students' critical thinking skills at SMAN 1 Bergas, and SMA Issuda on inducing and consider the induction the results as follows: 58%, 55%, and 54%. Critical thinking skills of students on indicators determine a course of action indicators included in the category is quite critical.

SMA N 1 Ungaran has a higher percentage of indicators to define the term and consider a definition than the two other high schools while the indicator specifies an action, the highest percentage is SMAN 1 Bergas.

Results of the questionnaire the percentage of students' critical thinking skills in each school is higher than the results of the test. It shows that students are actually able to think critically. However, this ability is less developed in daily life.

The student critical thinking skills are low due to the habit of teachers' teaching who often use the lecture method than the method or learning model that enhances the critical thinking skills. According to the teachers, they often use the lecture method because the method

is effectively used to deliver much biological material and the time was limited. This is consistent with Dewi & Riandi research (2015) stating that the student's critical thinking skills low due to the learning model that applied not excavate the students potential to think critically about a problem.

Lesson plan (RPP) prepared by a biology teacher at SMAN 1 Ungaran, SMAN 1 Bergas, and SMA Islam Sudirman Ambarawa in accordance with the demands of the 2013 curriculum, but in practice its implementation not as it is written in the lesson plan. That is because the teacher target all of the biological materials can be delivered.

The demands of the scientific approach in the 2013 curriculum cannot be implemented on any topic of learning. Based on interviews with teachers, effective lesson time is limited due to some effective time is used for school activities such as school exam and national exam so that students of grade X left. It is also disclosed in the Ariadi's research (2014).

Critical thinking skills level of students at SMAN 1 Ungaran, SMAN 1 Bergas and SMA Islam Sudirman Ambarawa are different. The differences are due to the teacher used the different learning model, the characteristics of students in each school and school facilities. A biology teacher of grade X at SMAN 1 Ungaran more frequent use of the learning model that can enhance students' critical thinking skills compared with the biology teacher in two other high schools. Students characteristics at schools and private schools are different. School facilities at SMAN 1 Ungaran and SMAN 1 Bergas are better than school facilities at SMA Islam Sudirman Ambarawa.

CONCLUSION

Based on the results of data analysis and discussion, it can be concluded that: (a) the critical thinking skills of students at SMAN 1 Ungaran, SMAN 1 Bergas and SMA Islam Sudirman Ambarawa included in the quite critical category. (b) there is a significant positive relationship between the questionnaire results to the test results of students. (c) there are differences proportion of students' critical thinking skills at SMAN 1 Ungaran, SMAN 1 Bergas and SMA Islam Sudirman Ambarawa.

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