



Implementation of Science Virtual Class Based Schoology to Improve Students' Critical Thinking Skill

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Abstract

Implementing appropriate strategies in learning so that students acquire 21st century skills is an important thing for teachers to do. These skills will equip students to adapt to the needs of their era. One of the skills is critical thinking. However, during the Covid-19 pandemic, all educational institutions were encouraged to carry out online learning to prevent massive transmission of the corona virus. In science learning, it emphasizes students to learn independently by providing clear instructions from the teachers to practice critical thinking. One of the media that can bridge the needs of students to learn independently in practicing critical thinking is Schoology. The purpose of this research was to find out the influence of schoology virtual science-based learning in improving critical thinking of students. The study was a quasi-experimental design. The sample of this research were 64 students taken through purposive sampling. The improvement of students' critical thinking skills was identified from the essay test given. The results showed that the size impact (d) reached high category (1.85). It means that the schoology virtual science-based learning have a high influence in improving students' critical thinking skill. Furthermore, the t-test showed a sig value. 0.000 and N-Gain in the experimental class reached 0.50 while the control class reached 0.27. It indicates that the implementation of schoology virtual science-based learning can improve students' critical thinking skill.

INTRODUCTION

The demands of education which support the needs of the globalization era plays a role as priority thing to be done immediately. Various parties who are concerned with education are starting to look for an alternative learning to embrace the needs for life in this century challenges. In the term of teaching learning, teachers need more creative strategy for teaching to answer these challenges. The actualization in real life shows that the main problem in formal educational level today is students who have low acquiring in learning (Aviana & Hidayah, 2015). It showed from the critical thinking aspect of students got worst. Winarsih & Mulyani (2012) stated that the dominance of teachers in teaching learning process should be reduced. Students must cover their willingness to be more intelligent, better, and prosperous. The learning must be implemented creatively and innovatively. One of them is follow the educational trend to get the students' aim and achievement in learning based on the Curriculum 2013. By Covid-19 outbreak, it forces all aspects in life using internet as a basic tool to do activity includes classroom learning. This makes the teachers and students are carrying out teaching and learning activities with online learning. Online learning is one of the new education paradigm. The 21st century education paradigm focuses students on mastering current skills (Kivunja, 2015). It is a must for students to master their future needs dealing with problems, challenges, and careers in society. Further, it is also supported by Binkley et al. (2011) who identify the 21st century skills in four groups: 1) ways of thinking, 2) ways of working, 3) tools of working, and 4) living the world. The 2013 curriculum identified 21st century skills in term of 4C, namely communication, critical thinking and problem solving, collaboration and creativity and innovation.

Communication skill is an ability to convey ideas (Hanifa et al., 2019), ideas (Morreale et al., 2016), and knowledge (Douglas & Gerde, 2019) in both oral and written forms (Valenzano & Wallace, 2017). Good communication skill will assist students in improving critical thinking skills. Kola (2019) states that critical thinking skills is analyzing, assessing, evaluating, reconstructing a problem to obtain rational and logical solutions. In problem

solving, students need a friend to discuss so that collaboration skills are acquired. Balser et.al (2017) states that collaboration is an ability to work together among groups to reach the goal efficiently and effectively. A creativity is an ability to discover a new thing by reviewing any issues to have novelty and unique sight (Jahnke et al., 2015). Thus, a critical thinking is the main ability to face this challenging era (Jang, 2015).

Critical thinking skill is a reflective thinking in the process of assessing the validity, reliability, or the truth. It plays an important role in science and it is a basic skill to overcome an important case in some point of scientific implementation process (Turkoglu & Cansoy, 2017; Papastephanou & Angeli, 2007; Saadé et al., 2012). Supported by Hashemi et al., (2010) that critical thinking is a high level of skills and plays an important role in moral, social, mental, cognitive, and scientific developments. Therefore, critical thinking skill is an ability of processing information to obtain a conclusion.

Science learning must follow paradigm alteration of 21st century which is forming students' space to develop their skill. The appropriate learning has specific characteristics: (1) an innovative learning by utilizing technological advances through learning media; (2) a conformity between cognitive and social abilities in the use of its material; (3) a freedom granting for student in order to be an active student in the process of learning (Alismail & McGuire, 2015).

Indonesia in the process of learning science has established critical thinking skills as one of the skills that must be trained. However, this cannot be realized optimally from the learning outcomes. Students' critical thinking skills are still at an unsatisfactory level according to some researchers (Manalu & Siregar, 2019; Shara et al., (2019); Nurdiana et al., 2019; Amto et al., 2019; Fitriani, et al., 2019). However, a program is set specially for this situation; International Student Assessment (PISA) presents measurements to assess high-level thinking skills including critical thinking skill. Based on PISA 2018, Indonesia rank was below other developing countries, even fell from the three years ago. Therefore, for any further research in this term should be vary and advanced. By providing an appropriate strategy, this current research uses Schoology to overcome this situation.

Schoology is a website that combines the concept of e-learning with social networks that can be accessed through internet connection both on applications computer and mobile. The other alternative way is directly accessed to www.schoology.com. In general, the function and use of Schoology is almost similar with other applications such as Edmodo or Moodle, but more advantages one. It has a similar layout design to Facebook. By looking at the trendy design, it fits for teenagers well. In addition, developing e-learning will fit during covid-19 outbreak. Schoology is also more profitable when it comes to Moodle. It does not require hosting and settings; it is easier (user friendly) than others. For Schoology's features include attendance, analytics, courses, group discussion, quiz, resources, assignment, gradebook, and others. They help students to improve critical thinking skills.

Critical thinking skill is an indispensable for science learning, one of them depends on the material. This current research focused on the chapter of motion. Object movement is one of the concepts that can be presented as problem solving activities. Meanwhile, according to a research conducted by Sutarto et al. (2018), the learning activities still dominated by passive learning, which is not two-way of interaction and internet still under-used as a medium of material delivery. Therefore, many students feel bored. According to some researchers conducted in several junior high school in Cilacap, classroom activity is still teacher-centered, also critical thinking is low as well. Yet the motion objects are a contextual concept and closely related to the daily issues. It can be presented by active learning and integrated to the daily phenomena. Thereby, students can implement the concept in real problems.

The topics in schoology have been widely used by other research related to the use of the internet as a learning resource in various learning. Suryati et al. (2019) conducted research on learning of using schoology in improving high-level thinking skills. Furthermore, implementation schoology on student sheets (Pradana, 2017) and STEM application (Ardianti et al., 2019) were also conducted to improve students' critical thinking. Another interesting issues of comparison, a research by Sulisworo et al. (2020) compared schoology and google classroom in improving students' critical

thinking. Those researchers showed every improvement in critical thinking skills. Therefore, schoology-based learning activities can improve thinking skills. The facts and backgrounds that have been disclosed encourage the implementation of this research to determine the extent to which virtual schoology science-based learning can improve students' critical thinking skills.

METHODS

This research is a quasi-experimental research with a quantitative approach and tested by the control group pretest-posttest design. The design of this study was carried out on two classes; they were (1) the experimental group and (2) the control group. The experimental class applied science virtual class while the control class used e-learning without virtual laboratory, the learning management system which is used as an online media by schoology application.

This research was conducted at SMPN 1 Majenang Cilacap in the academic year of 2019/2020. The sample of this research were 64 students grouped as the experimental class and control class taken through a purposive sampling. Data were collected through pre-test and post-test. Furthermore, by giving essay questions, it gave deeper analysis on students' critical thinking skills. The analysis has been carried out by using a t-test analysis and size impact (d) to find out the differences between the experimental class and the control class. Additional measurement used N-Gain to find out the increase of experimental class and the control class.

RESULTS AND DISCUSSION

The influence of Science Virtual Learning (SVC) analysis was carried out by analyzing N-Gain data on students' critical thinking skill. Later, the data processed to get the size value impact notated with d . The calculation data is presented in Table 1.

Table 1. The calculation of size impact towards critical thinking

Variables	Experiment class	Control class
<i>N-Gain</i>	0.50	0.26
Standard deviation (<i>d</i>)	0.14	0.07
	1.85	

Based on the table above, it shows that the value of the impact size obtained 1.85 which is high categorized. Then, Schoology-based SVC learning implemented has high influence in improving students' critical thinking skills. In other words, students' critical thinking improvement in

experiment classes is the effect of Schoology-based SVC learning being implemented.

Critical thinking skills of students were measured using critical thinking tests given before and after implementation. The pretest was used to find out students' prior sight before treatment. While Posttest was used to measure students' skills after treatment been implemented. Then, all the data were analyzed to determine differences in students' critical thinking skills both in the group of students who were given Schoology-based SVC learning and the group of students who were given conventional learning. In determining the quality of them, the calculation of N-Gain was applied.

Table 2. The Analysis of N-Gain

Variables	Experiment class	Control class
Mean of <i>Pretest</i>	28	22
SD _{<i>pretest</i>}	11.45	8.39
Mean of <i>Posttest</i>	65	43
SD _{<i>posttest</i>}	9.6	5.99
<i>N-Gain</i>	0.50	0.26
<i>SD</i>	0.14	0.07
Normality test	Sig. 0.2 > 0.05 \ (Normal distributed)	Sig. 0.2 > 0.05 (Normal distributed)
Homogeneity test	Sig. 0.5 > 0.05 (Homogen)	
Hypothesis test	<i>Asymp. Sig (2-tailed)</i> 0.000	

From the calculation above, the N-Gain for the experiment class is 0.50 with moderate improvement. Meanwhile, the N-Gain of control group is 0.26 with low improvement.

Accordingly, the significant comparison of the two groups can be analyzed from the N-Gain averages of both groups. The following are the results of a descriptive analysis of the both N-Gain as a prerequisite test in conducting an average of two-equation test.

Based on normality test, N-Gain data for experiment classes and control classes were distributed normally. In addition, from the homogeneity test can be inferred as a homogeneous population. Therefore, the tests were conducted by using Independent Sample t-test to find out the difference of the two groups.

The hypothesis test shows that the significance is less than 0.05. It indicates Ho was rejected. Thus, it can be concluded that there is a

significant difference in critical thinking skills between students who carried out Schoology-based SVC learning compared to students who were not.

By showing the explanation above, it can be concluded that the implementation of SVC learning based on Schoology further improves critical thinking skills compared to the results of the implementation of the conventional learning.

According to the results of critical thinking test, it shows that the students in the experiment class and control class were improved. How to find out the improvement of each aspect of critical thinking in each group, it applied by calculating the normalized N-gain for each aspect. The N-Gain is derived from the average of scores in every indicators divided by the maximum number of scores. Figure 1 presents the N-Gain compare to each indicator in the experiment class and control class.

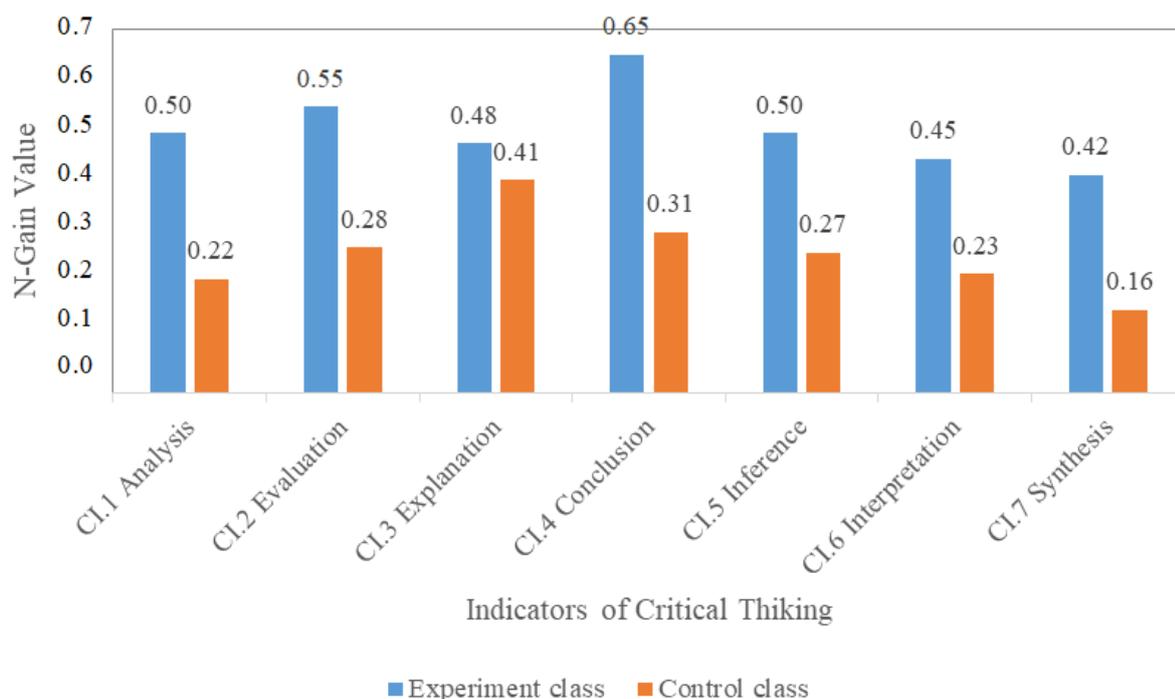


Figure 1. The diagram of N-Gain compares to the aspects

Entirety results, the improvement of critical thinking skill in each aspect of the experiment class is higher than the control class. The highest improvement for the experiment class occurs in the CI.4 (interpreting aspect). While the lowest increase is in the CI aspect.7 (concluding).

The influence of Schoology-based SVC on critical thinking skill was analyzed based on the pretest and posttest scores. The Pretest and posttest questions plus indicators for each consisted of 7 questions. The indicators were used for analyzing, explaining, evaluating, interpreting, synthesizing, concluding, and inferencing.

Based on the Table 1, it shows that the value of the impact size is 1.85 which is categorized as high. Addition, the implementation of Schoology-based SVC learning has a high influence in improving students' critical thinking skills. It is also reached to the average of N-Gain experiment class by 0.50 and the control class by 0.26. The results present there is a differentiation. It happens because the experiment class was in a moderate category, while the control class had a low category of N-Gain. Learning by using Schoology-based SVC that runs smoothly, making students more active and enjoy. It is an effective strategy to exchange their opinions as well. As Shishigu, et al (2017) mentioned that the application of the PBL model made students more enthusiast in learning.

Therefore, they become active and the learning achievement increased.

Learning using SVC-based becomes effective and efficient strategy. In addition, the effectiveness of time in experimental classes well done. It happened because students read the material before learning so that they became more understanding. In addition, by audiovisual learning, they more acquired better in the classroom activity. Online learning allows students to explore resources quickly and easily. It encourages students to learn to be critical and selective for the sources. Students can control their own learning style and be free to decide how to learn on their own. Suarsana (2013) mentions that technology will help all kinds of thinking skill development. Starting from the most basic to high levels of critical thinking.

The online discussion forum on SVC learning also encourages students to deliver their ideas. Purposely, they are trained to respond or criticize their friends' opinions. Asking and responding by online discussion forums is so widely opened. So that, it encourages the formation of learning communities. Supported by Herlanti et al., (2012) that the existence of learning community will have an impact in improving the quality and depth of thinking as well as encouraging the inquiry process. For both will have a direct impact on improving critical thinking skill. By online learning, many resources can be utilized by students to learn, in the

form of wikis, blogs, websites, youtube (Cheung & Hew, 2011). These results are in line with research conducted by Cahyadi et al., (2012) in improving critical thinking skills by online discussions can provide sufficient time and space for students so that their skills improve.

CONCLUSION

Based on the results and discussion of this research, it can be concluded that the application of science virtual learning based schoology can improve students' critical thiking skill in junior high school.

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