Application of the Google Classroom-Assisted *Blended-Inquiry* Method on Students' Critical Thinking Skills

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This study aims to determine whether or not there is an effect of the Google Classroom-assisted blended-inquiry method on students' critical thinking skills. The population in this study included all eleventh grade students of Senior High Schools in Mataram. The research sample consisted of two classes, namely, one class as the experimental class and one class as the control class, both of which were selected by random sampling after the classes were levelled. This study uses a quantitative approach - more specifically, a Quasi Experiment with Non-equivalent Control Group Design. The instrument used was a multiple choice test which was deemed valid and reliable, and met discrimination power and difficulty level index. All data was analysed quantitatively using comparative analysis and N-Gain test. The experimental test results show that there are differences in critical thinking skills of students in the experimental and control classes, thus it is concluded that the application of the Google Classroom-assisted blended-inquiry method has an effects on students' critical thinking skills. Gain score analysis results showed that the increase in each critical thinking skill dimension of students in the experimental class is higher than the other class'. This implies that the use of Google Classroom-assisted blended-inquiry method can serve as a supplement to strengthen constructivist theories in learning design.

Keywords: *Blended-Inquiry, Google Classroom, Critical Thinking*

Introduction

In general, the learning process should be able to develop knowledge, creativity, innovation, confidence, collaborative skills, and critical thinking skills needed to face various challenges in an increasingly competitive era (Susilo, 2014) as well as to make the right decisions (Lau, 2011), as demanded of 21st century competencies (Rotherham & Willingham, 2009). Critical thinking skill also serves as an instrument to generate competitive graduates (Sukardi et al., 2019). However, as a matter of fact, there aren't many students with critical thinking skills (Hadi & Junaidi, 2018). The results of Larsson's (2017) study show that students' lack of critical thinking skills is characterised by their inability to ask relevant questions and make conclusions. This is due to the learning model applied by teachers, which is still teacher centred (Fuad et al, 2017). In addition, the delivery of the material does not involve the active role of students (Adekantari et al., 2020), and is passive (Vaughan, 2010), especially those related to the students' experience (Stupple et al, 2017). Thus, it can't be denied that students are still less able to express ideas and solve problems (Shaheen, 2016; Ellis et al, 2016). Thus, the learning process should create a pleasant atmosphere, and it should be able to motivate students to take an active role (Ulger, 2018). The learning process should also involve technology in learning, which can develop students' critical thinking skills (Adekantari et al., 2020).

One learning method that involves students actively, collaboratively and uses technology in learning is the blended-inquiry method (Vaughan, 2010). This method helps students learn to be more independent and flexible (Garnham & Kaleta, 2002), and to be collaborative while building knowledge (Vaughan, 2010). It also helps the students focus more on learning, get more relevant material sources, develop thinking skills (Zain, 2018), discover ideas (Akyol et al, 2009), increase satisfaction, motivation, and learning outcomes (Shea & Bidjerano, 2010). However, this blended-inquiry method has some weaknesses, such as: the learning monitoring being poorly controlled or complicated (Gedik et al, 2012). Therefore, the blended-inquiry method, when implemented, needs to be supported by the use of Google Classroom. A couple of studies have combined it with other apps, that is, WhatsApp (WhatsApp group) (Purnama, 2020), and telegram (Singh et al, 2020). Combining the method with Google classroom has been proven to be effective in increasing students' enthusiasm and discipline in learning (Sukmawati & Nensia, 2019), as well as in increasing their learning outcomes (Bagas, 2017).

In this study, Google Classroom is expected to improve students' critical thinking skills. Google classroom itself has a variety of features that facilitate student's learning outside the classroom. These features also make it easy to be monitored by the teachers. In addition, it also has other features to facilitate the teaching and learning process (class management) (Azhar & Iqbal, 2018), especially in assignment collection (Shaharanee et al, 2016). Specifically, this study aims to determine whether or not there is an effect of the implementation of the Google Classroom-assisted blended-inquiry method on students' critical thinking skills.

Literature Review

The ability to think critically is one of the abilities that students need to master (Lau, 2011). This is because critical thinking can help improve students' performance (Fero et al, 2010). As found in the research conducted by Changwong et al (2018), the higher the students' critical thinking skills are, the higher the students' learning outcomes will be. This is because critical thinking is directed towards the goal (Halpern, 1998) as well as the actions taken (Hasanah & Malik, 2020). Critical thinking includes the ability to verify assumptions, notice hidden opinions, evaluate evidence, and assess conclusions (Fisher, 2011). The students are not merely memorising, but they are encouraged to develop a hypothesis and analyse and synthesise a phenomenon (Karacoc, 2016). However, the context remains about fostering students' thinking skills (Hashemi, 2011), which involves reasoning and logic to solve the problems (Page & Mukherjee, 2006). As for the indicators of critical thinking in this study, they are based on Facione-Angelo (Seventika et al, 2018), which include: 1) interpreting the problem; 2) analysing alternative solutions; 3) giving opinions; 4) evaluating solutions; and 5) concluding the results obtained, along with supporting evidence.

The blended-inquiry method serves as an alternative method to achieve these indicators. The blended-inquiry method is a learning method developed by Garrison et al. (Vaughan, 2010) by integrating online features into inquiry-based learning steps. According to Susilo (2014), blended-inquiry is an application of inquiry learning that is supported by the use of information technology (IT) in the learning process, so as to focus on the learning itself. In addition, Suwono et al (2017) states that blended-inquiry is an inquiry learning method that requires scaffolding in order to get the students involved in questioning and problem solving activities, aiming to improve student thinking processes. Here, scaffolding is carried out through direct or face-to-face meetings and online (digital) media. The blended-inquiry method will be more optimal when combined with devices or tools that the teachers and students can access easily. In this case, Google Classroom has been proven effective in facilitating the learning process (Shaharanee et al, 2016). The advantages of Google Classrooms are that: it includes features that can be used to create and collect assignments, saves space and time, and is affordable, safe and comfortable (Rozak & Albantani, 2018). Thus, the Google Classroom-assisted blended-inquiry method is a learning method that exposes students to problem exploration by developing ideas and requiring students to conduct technology-optimized investigations (Vaughan, 2010).

The steps for the Google Classroom-assisted blended-inquiry method used in this research encompass: 1) problem presentation, that is, presenting the problem in face to face classes and further strengthening the problem through Google Classroom; 2) exploration, namely, the activity of searching for the answers to the problems encountered. At this stage, students and teachers discuss the problem through Google Classroom; 3) integration, which is marked by the integration of experiences and ideas obtained during the exploration process; 4)

resolutions/applications, which provide new ideas or maintain a solution to the problem; 5) group result presentation, which is when the results of each group's discussion are uploaded into Google Classroom, and then corrected by other groups.

Research Methods

The approach used in this research is a quantitative approach, a type of Quasi Experimental with Non-equivalen Control Group Design (Ary et al, 2010). Details are visualised in Table 1 below.

Table 1: Non-equivalent Control Group, Pretest-Posttest Design

Class (Group)	Pretest	Treatment	Posttest
A	Y1	X	Y2
B	Y1	-	Y2

Based on Table 1, Class A served as the Experimental Class and was treated with the Google Classroom-assisted blended-inquiry method while Class B is the control class treated with the conventional model. Both classes were given a pretest and a posttest in order to observe the increase in critical thinking skills for each class.

The population in this study were all eleventh grade students who major in Social Sciences, while the study sample consisted of two classes: one class serves as the experimental class and the other class as control class. The two classes were taken by random sampling after the classes were levelled (Ary et al, 2010). The leveling of the class includes leveling the students' IQ and learning outcomes, as well as the number of students, the teacher's ability and sincerity, time allocation, learning schedule, and the control class evaluation instrument prepared by researchers (Sukardi, 2017).

The data collection instrument used an objective test in the form of multiple choices which had met instrument evaluation for quality in the form of validity, reliability, discrimination power and difficulty level test. The results of the validity test showed that out of 30 questions, 21 items were considered valid. The results of the reliability test showed that the questions were characterised as having a relatively high value, with a correlation coefficient of 0.911. The results of the difficulty level analysis discovered that 2 questions are categorised as easy, 9 questions as medium, and ten as difficult. As for the discrimination power test, it was discovered that 14 questions were regarded as 'sufficient' and 7 questions as good. Thus, from the results of the trial and analysis, 21 items that met instrument quality were obtained.

The overall data was analysed using comparative analysis with two independent samples after fulfilling the requirement for homogeneity and normality test. In addition to the comparative test, data analysis was also followed by the N-Gain test. The N-Gain test was used to observe the tendency of the students' critical thinking skills to increase, before and after the treatment.

Results and Discussion

The results are described in three parts such as the results of the requirement analysis test, hypothesis testing, and the N-Gain test.

Results of the Requirement Analysis Test

In this case, the requirement analysis test involved the normality and homogeneity tests. The normality test was examined by means of the analysis of Kolmogorov Smirnov. The results suggest that the experimental class obtained score 0.288 whereas the control class obtained $0.194 > 0.05$. Based on these results, it can be inferred that both classes were normally distributed. On the other hand, by employing the test of homogeneity of variance, it was discovered that the levene statistic score for the homogeneity test is $0.85 > 0.05$. Therefore, both classes were homogeneous.

Results of Hypothesis Testing

The results of hypothesis testing are summarised in Table 2.

Table 2: Summary of the students' critical thinking skills' t-test results

Variables	Class	N	Average	Sd.	Calculated t-score	Df	t-table	Sig.
Critical Thinking Skills	Experiment	25	75	11.01	3.49	47	2.021	0.05
	Control	24	38	11.89				

Source: Primary Data Processing

Table 2 suggests that the use of the Google Classroom-assisted blended-inquiry method affected the students' critical thinking skills. The evidence has been confirmed by a t-score of 3.49 which is higher than the t-table (2.021). Correspondingly, it is followed by the average value of experimental class which is greater than control class.

Results of the N-Gain Test

The N-Gain test was employed to measure the increase in the students' critical thinking skills. The following table describes the N-Gain scores of both classes.

Table 3: The Result of N-Gain Test for Experimental Class and Control Class

Class	Pretest average	Posttest average	N-Gain	Category
Experiment	26	75	0.66	Moderate
Control	28	38	0.13	Low

Source: Primary Data Processing

Table 3 suggest that the increase in the experimental class' pretest and posttest score differs from the increase in the control class' pretest and posttest score. The highest improvement comes from the experimental class, which scored 0.66. This demonstrates that the critical thinking skills of the students in the class that uses the Google Classroom-assisted blended-inquiry method is greater than those in the class that uses the conventional method.

Furthermore, differences in the increase in students' critical thinking skills are visualised in Figure 1. The differences were obtained in accordance with the indicators such as analysing and concentrating on the problem, analysing the solution of the problem, implementing the obtained solution, evaluating the solution, and drawing a conclusion based on the results completed by the supporting evidence (Seventika et al., 2018).
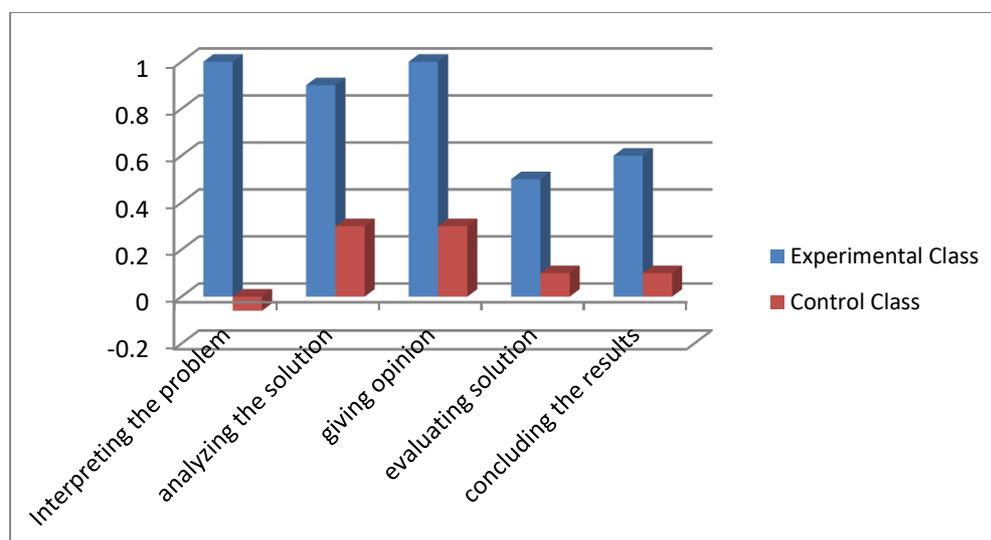

Figure 1. Comparison of the increase in the students' critical thinking skills for each indicator

Figure 1 suggests that students' critical thinking skills in the experimental class is higher than that in the control class. For instance, the higher increase in the first indicator occurs in the experimental class instead of the control class. The use of the blended-inquiry method helped the students gain real experience through the exploration stage. Hence, students are able to deal with the problems, based on relevant sources.

The previous section shows the relevance of the Google Classroom-assisted blended-inquiry method with constructivism theory. This theory is viewed as a model to create a proper learning environment that is able to encourage the students to construct their knowledge and skill through direct experience (Jin, 2017). In line with this, Sudarsana (2018) accomplishes that the construction is built up based on the student's ideas as an alternative form of particular actual problem solving. Similarly, Sukardi et al. (2014) claims that students face the process of problem solving directly through their experience. This is in line with Suwono et al. (2017) who assert that the implementation of the blended-inquiry method emphasises the students' exploring activities outside the classroom. This claim is supported by the study conducted by Sholikh et al. (2019), which stated that such a method is more effective than face-to-face learning in the classroom. This is considering that learning outside the classroom can also help the students avoid saturation, boredom, and the perception that learning only occurs inside classrooms (Sukardi, 2016).

In addition, the blended-inquiry method gives an opportunity for the students to be more actively involved in solving problems (Suwono et al, 2017). Simultaneously, students are also taught about how to think critically through investigation, reflection, exploration, and experimentation (Alameddine & Ahwal, 2016). This method can improve thinking skills - particularly critical thinking skills - as well as shape one's intellectual skills (Turnip et al., 2016). The use of an application in learning is also very influential in facilitating the learning process. One application that can be used is Google Classroom (Al-Maroof & Al-Emran, 2018). Google Classroom does not only facilitate learning, but also increases the students' critical thinking skills (Al-Maroof & Al-Emran, 2018; Sholikh et al., 2019). Thus, it is regarded as one of the active-learning tools (Shaharanee et al., 2016).

The results of this study hence further emphasise the findings of previous studies regarding the application of Google Classroom in the learning process (Iftakhar, 2016; Jakkaew & Hemrungrote, 2017; Bagas, 2017). Therefore, this study has confirmed that the Google Classroom-assisted blended-inquiry method is one of the learning methods that can improve the students' critical thinking skills. This is because the students who use the blended-inquiry method with Google Classroom have access to information that is not limited to place and time, and hence, they have more time to revise the lesson and the exercises (Sholikh et al., 2019).

Conclusion

Based on the results and discussion, it can be concluded that the Google Classroom-assisted blended-inquiry method does have an influence on students' critical thinking skills. This implies that the method can make learning more contextual, interesting, innovative, and student-centred, so as to foster the students' motivation, and improve their problem-solving abilities and critical thinking skills. Thus, the Google Classroom-assisted blended-inquiry

method may serve as a supplement to strengthen constructivism theory for the improvement of the quality of learning in the social field.

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