

Effects of Cooperative Blended Learning Using Google Classroom on Critical Thinking Skills

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Abstract. This study aims to analyze the impact of online learning with a blended cooperative learning strategy assisted by Google Classroom on improving critical thinking skills. The design of this study was a pretest posttest controlled group design. This research was conducted on physics lessons on energy matter and business for the tenth grade. Critical thinking skills are measured using previously validated essay questions. The statistical analysis technique used is ANOVA. The results of the study indicate that there is an influence of learning strategies on improving critical thinking skills. Students who are taught by cooperative learning blended assisted by Google Classroom tend to have higher critical thinking skills after learning than students taught with direct lesson instruction.

Keywords: *blended learning, cooperative learning, online learning, physics, education, critical thinking skills.*

INTRODUCTION

The progress of science and technology, especially Information Technology and Communication (ICT) is that many bring a positive influence on the improvement of education. Formal and non-formal educators can use ICT to support the learning process. The advantages offered not only lie on the fact of speed and convenience in obtaining information or sources of material, but some multimedia facilities can make the learning process more exciting and interactive [1]. The advantages offered by e-learning such as learning opportunities that are more flexible without being bound by space and time, making it easier for people to access education, enriching learning materials, enlivening the learning process, making learning processes more open, improving learning effectiveness, and supporting students to study independently in order that learning problems in physics can be reduced [2].

An educator of the 21st century should be able to build knowledgeable students that have critical thinking skills. Physics subjects that study natural phenomena should have to exercise these abilities in the learning process. The better understanding of natural phenomena can be obtained through critical thinking skills enhancement. Critical thinking skills can be measured using various possible responses and choices to solve problems. However, in learning the teacher is more active while the students are passive in receiving the lesson. Learning problems need to be done to improve learning strategies so that students can have the ability to think critically and

take the pill in solving problems [3]. Cooperative learning is a set of teaching strategies designed to educate group cooperation and interaction between students [4] which can now occur through cyberspace in the form of personal learning [5]. Cooperative learning demands students to construct their knowledge through active learning and discussion with peers in e-learning.

Team Games Tournament (TGT) is one type of cooperative learning that places students in study groups consisting of 5 to 6 students who have different abilities [6]. Learning achievement and student motivation who were taught to use cooperative learning models with the TGT strategy, overall higher than those taught to students using conventional learning models in physics lessons [7, 8].

The blended learning model can meet different learning characteristics. Blended learning is a combination of face-to-face learning with e-learning learning. Blended learning helps motivate students learning and make learning purpose clearer for students. The effect of blended learning on student achievement can be increased if the teacher actively involves students in the learning process. The effectiveness of student learning can be improved by giving question with the level of complexity [9].

The use of information technology tools, including the Learning Management System (LMS) has become a necessity for implementing LMS in schools. There are several open source LMS technologies that can be used in the development of e-learning for schools [1]. Google classroom is a multiplatform application that is easy to use. Teachers and students can visit the site <https://classroom.google.com> or download the application via the Playstore at android or app store with google classroom keywords.

Based on the description above, in e-learning, there is less interaction between students and students, interactions between students and teachers, as well as the interaction of students to learning resources [10]. Therefore, the researcher intends to implement learning strategies TGT on learning to build interaction between students and students, interactions between students with teacher, as well as student interaction with learning resources. The identified issues are e-learning instructional strategies are less considered, low skill on how to build online interaction between students and students, interactions between students and teachers, and how to maintain student interactions with learning resources in blended learning. In connection with the

background, this study will be limited to the influence of Google Classroom assisted blended learning model to critical thinking skills. The effect of learning strategy is in the Energy and Work matter measured for tenth-grade students in Yogyakarta, Indonesia. The problem in this research is the application of based learning strategies TGT using Google Classroom influence on critical thinking skills in physics learning.

THEORETICAL BACKGROUND

Students' learning interest in blended learning is better than students' interests who learn conventionally [11]. Classes that study blended learning are more independent than conventional classes. Moreover, blended learning classes have improved learning outcomes better than in conventional classes [12, 13]. Students perceived that Team Games Tournament (TGT) – Based Cooperative Learning Application using is easy to use and quite useful [14]. Good results in this kind of research are the basis for research using blended learning for Energy and Works subject.

Interaction is a reciprocal event that occurs between two objects and two actions. Interactions occur when objects and events influence each other. Interaction determines the continuity of the processes and activities carried out in learning that the most critical components in distance education. Student interaction refers to reciprocal communication in two directions or between students who exchange information, knowledge, thoughts, or ideas about the subject matter. In groups, students can interact with each other to discuss the material provided, and the teacher can be present in this group to give a little review of the material given [15]. The interaction between students was the most influential factor among the determinants of student's satisfaction [16]. Applying technology training orientation before starting e-learning learning can help increase students' confidence in doing e-learning. Teachers are encouraged to design more cooperative activities in learning to improve student interaction.

Critical thinking skills is a systematic, directed, and precise process that is used to shape and build trust and take action to argue in an organized manner in activities. Like solving problems, making decisions, analyzing assumptions, and conducting research [3]. Critical thinking is a systemic evaluation or formulation of beliefs, or statements, by rational standards [17]. Critical thinking is a systematic evaluation or opinion with reasonable standards [18]. The ability to think critically involves three components, namely: The attitude used to consider wisely on a problem and subject that is in a variety of one's experiences, knowledge obtained from a method of inquiry logically, and some skills in applying these methods [18].

There are 12 indicators of critical thinking skills, which are summarized in five stages as follows, namely essential clarification, the bases for the decision, inference, advanced clarification, and supposition and integration [19].

Blended learning is a flexible approach to designing programs that support a mix of various times and places for learning. The blended learning model is a combination of the advantages of learning done face to face and e-

learning. Learning e-learning in blended learning is a natural extension of traditional classroom learning using face-to-face models [11]. Through this model, the learning process will be more effective because face-to-face teaching and learning assisted with e-learning in anywhere. Blended learning combines aspects of web or Internet-based learning, video streaming, audio synchronous, and asynchronous communication with traditional or face-to-face learning [20].

Based on the explanation above, blended learning is combined learning between face-to-face learning in the classroom with e-learning. Blended learning utilizes information technology in the form of e-learning as a medium in delivering more exciting learning. The learning process with blended learning will be more effective because the learning process in face-to-face was assisted by web-based learning in different places and times [13]. Teachers and parents of students have an equally important role, teachers as facilitators and parents as supporters [9, 20].

TGT is a type of cooperative learning that places students in study groups consisting of 5 to 6 students who have abilities, different sexes. The teacher presents the material as well as students work in their respective groups [8] by emphasizing on achieving group goals and success based on group member assignments. The group's goals and success are not only in understanding a lesson, working to solve a problem but also learning something in groups. The main components in the TGT learning model are [6] class presentation, grouping, games and tournaments, and teams recognition

Google Classroom is a product part of Google for education that is very special, because the content has many facilities in it such as giving announcements or assignments, collecting assignments and can find out who has collected tasks. This benefit is because students can collect assignments, distribute assignments, and discuss lessons anywhere without being bound by time limits or lesson hours [14]. This flexibility makes the learning process more exciting and more efficient in terms of time management, and there is no reason for students to forget about the assignments given by the teacher. Students can delete part of the desired task; there are no automatic quizzes and tests. In general, google classroom is more suitable for mixed learning experiences than a full e-learning program [12].

METHOD

A. *Research Context*

This research is an ex post facto study that a study conducted to examine events that have occurred and then trace back to find out the factors that can cause these events.

The population is a generalization area consisting of objects that have certain qualities and characteristics to be applied by researchers to be studied and then drawn to conclusions. Following the research title, the study population was tenth-grade student ini Yogyakarta, Indonesia. Samples are part or number and characteristics possessed by the population. The sample was collected using cluster random sampling. The two group samples used as control group and treatment group.

Independent variables are variables that influence or are the cause of change or the emergence of dependent variables. The independent variable in this study is the learning strategy. Dependent variables are variables that are affected or become a result because of the existence of independent variables. The dependent variable in this study is the ability to think critically. The analysis of the effect of learning strategies on the results of critical thinking skills was used variance analysis (ANOVA).

B. Research Instrument

The test of critical thinking skills aims to identify and justify concepts, generalize, and solve problems. The test used is a test in the form of an essay to trace the answer process. The number of test is ten items. The maximum score for each item is 10. Before using the essay test, all of the items must be checked regarding the validity, reliability, level of difficulty, and the power of different questions.

C. Research procedure

The implementation of blended learning begins with preparation, such as installing google classroom on the mobile phone. Then the teacher explains the use of the google classroom application to be used during e-learning as well as forming groups conducted randomly in the first stage in TGT learning. After the group is formed, students gather with their groups to discuss and do games. Discussion material and games are available on the google classroom application. After class ends, students can communicate with each other as well as communicate with the teacher through the google classroom application so that the teacher can make observations to find out student interactions on the Google Classroom. After the students learn the material, the teacher arranged the inter-group tournaments. At the end of the meeting, the students was given a question to find out their critical thinking skills.

RESULTS AND DISCUSSION

D. Data Collection and Analysis

Following Figure 2 is the example of scoring of the student's work.

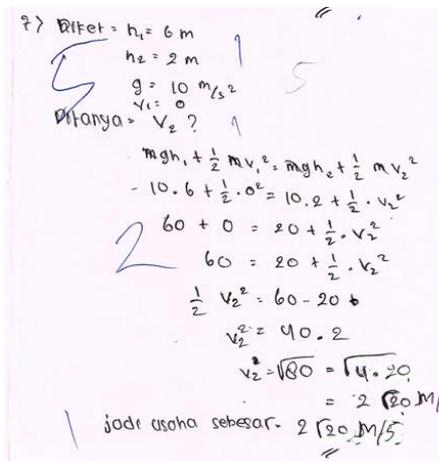


Fig. 1. The example of student's work scoring

Table I shows the descriptive of the critical thinking skills.

TABLE I. DESCRIPTIVES OF CRITICAL THINKING SKILL'S SCORE

	N	Mean	Std. Deviation	Std. Error	Min.	Max.
Direct lesson instruction	24	78.63	6.84	1.40	69.00	96.00
Cooperative blended learning	21	82.33	5.04	1.10	73.00	89.00
Total	45	80.36	6.29	.94	69.00	96.00

The normality test is done to find out whether the sample has a normal distribution or not in critical thinking skills score using error margin equal 0.05. The analysis of the statistical test used was Shapiro-Wilk because the data is less than 50. Homogeneity test is done to find out whether the sample comes from the same variant or not using error margin equal 0.05.

Based on Table I, Figure 2 shows the score of critical thinking skill in graphics.

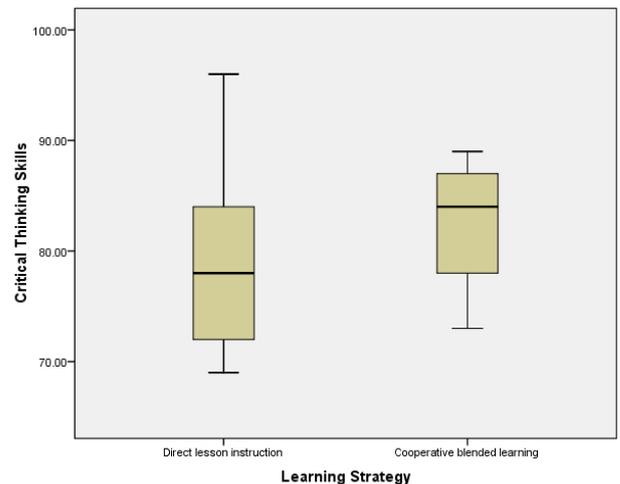


Fig. 2. The plot of critical thinking skills score

The Anova test used variance analysis techniques of two variables is presented by Table II.

TABLE II. ANOVA RESULT FOR CRITICAL THINKING SKILL'S SCORE

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	154.019	1	154.019	4.180	.047
Within Groups	1584.292	43	36.844		
Total	1738.311	44			

Based on Table I, the amount of F is 4.180 and the error is less than 0.05 (see Sig.= 0.047). It means that there is significant difference of means between two groups.

E. Discussion

From the results of data analysis, it was found that there were significant differences in the average score of critical thinking skills between students taught with Google Classroom assisted cooperative blended learning with classes that did not use Google Classroom. Students who are taught with cooperative blended learning have a higher critical thinking skill score due to several factors, namely a clearer interaction, the higher opportunity to repeat learning of material and exercise, access to broader learning resources.

In online learning, students can access material provided without limitation of time and place. This convenience makes students more free to learn according to the speed of understanding the material by each student. Students can also practice repeatedly on the questions provided to achieve a certain score.

This study uses the blended learning model for student learning interactions. Blended learning is e-learning, combined with face-to-face learning applied using Google Classroom. Teachers, especially physics teachers, should use the blended learning model as alternative learning so students are not saturated so that the deepening of learning material by students can be better. However, the teacher must also pay attention to other aspects, such as the means for students to joint e-learning. This research is expected as a source for the study of similar research. Further research can develop a better instrument and can develop this research.

CONCLUSION

The results of the study indicate that there is an influence of learning strategies on improving critical thinking skills. Students who are taught by cooperative learning blended assisted by Google Classroom tend to have higher critical thinking skills after learning than students taught with direct lesson instruction. This cooperative blended learning has good opportunities due to several factors, namely a fluent clearer interaction, the higher opportunity to repeat learning of material and exercise, access to broader learning resources.

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