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Application of Google Classroom Assisted Blended Learning in Improving Mathematical Critical Thinking Skills

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Abstract

This blended learning model, assisted by Google Classroom, is believed to be able to improve students' mathematical critical thinking skills when the distance or online learning system is implemented. This study aims to prove how the Google Classroom-assisted blended learning model can improve students' mathematical critical thinking skills. This study uses quantitative research with the research design used is a quasi-experimental design. This research did not start with a pretest and involved 60 person SMK students. The data were obtained by taking samples using cluster random sampling. The research instrument used was in the form of description test questions. Data were analyzed using normality test, homogeneity test and hypothesis testing. Based on this study, the results of hypothesis testing were obtained with tcount of 2.610 and ttable of 2.001 (2.610 > 2.001). So H_0 is rejected and H_1 is accepted. With the acceptance of H_1 from the results of hypothesis testing, it can be concluded that the blended learning model assisted by google classroom can improve students' mathematical critical thinking skills, especially in trigonometry material. Teachers can use this google classroom-assisted blended learning model as an alternative learning model to improve mathematical critical thinking skills in online learning.

Keywords: blended learning, google classroom, mathematical critical thinking skills.

1 INTRODUCTION

Critical thinking is seen as the ability to think to compare two or more information, and be able to conclude it with full consideration, clarity and be able to evaluate what has been obtained from the thought. Ghiffar (2018) explains that critical thinking is included in the category of abilities needed to face the 4.0 revolution. Therefore, during the industrial revolution 4.0, this critical thinking ability became a basic ability that every graduate at every level of education needed to have. This critical thinking ability is very important for every student. Therefore, this critical thinking ability needs to be applied to students so that students are accustomed to studying, researching, and reviewing things that are necessary (Nailul, 2018).

However, based on the results of the initial observations of researchers at SMK Merah Putih, Bekasi City in class X with a total of 30 students, the quality of learning outcomes shows that class X students have low critical thinking skills or have not been maximized. The low critical thinking ability of students in terms of the learning process, many students still cannot know their critical thinking skills in solving problems in the material provided. Students tend to be passive in receiving information conveyed by the teacher during the learning process, only 6.7% of students express their opinions in solving a problem from a problem. In addition, only 13.3% of the 30 students showed their activeness in asking questions and expressing opinions. When the teacher asks questions, the answers or responses given by students also did not show answers based on the analysis of the questions and problem solving or critical thinking skills. The initial test at the time of observation given to students in trigonometry material can be seen in Figure 1.

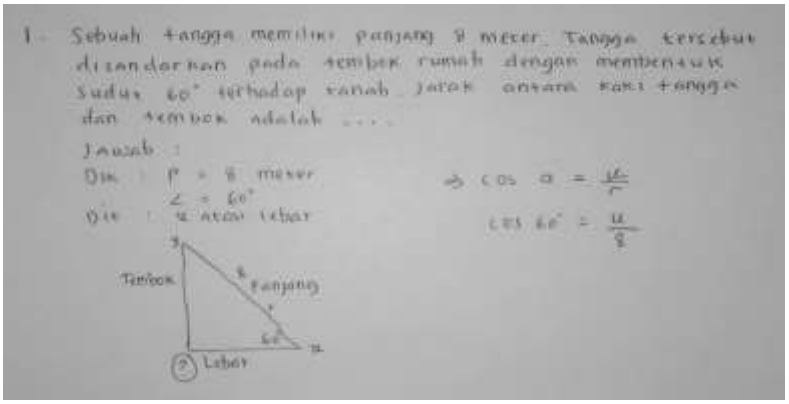

Figure 1. Student answers

On Figure 1, we can see that students can write or convey what they know, can analyze questions, but students have not been able to focus on questions, it can be seen from student answers that do not match the questions given. In solving the problem, the student does not understand the problem being asked, let alone can determine the solution to the problem. This shows that the student has not been critical in understanding the problem. Of course, the student is not able to write the answer correctly and is not able to convey his conclusion when solving the problem. So it can be concluded that these students have low mathematical critical thinking skills.

Teachers can use the blended learning model as a learning model in online learning. Husamah (2014) states that the blended learning model is a fairly effective solution for the learning process that is suitable not only for learning needs but also for the way students learn. Furthermore, Eko (2021) states that the blended learning model can improve critical thinking skills and creative thinking skills. Judging from the learning process Cahyadi (2012) shows that the learning process that applies blended learning is better able to improve students' critical thinking skills when compared to the conventional learning process.

A number of studies have proven that the blended learning model can improve critical thinking skills. Wayan (2019) has investigated the critical thinking and problem solving skills of students using blended learning with those using direct instruction. Likewise, Sofiatul (2020) found that there was a good influence between the blended learning model and critical thinking skills on student achievement and there was a good interaction between the blended learning model on student achievement. Anggian (2019) has proven that the critical thinking ability of students who study with the blended learning model is higher than the conventional learning model.

The research listed above has proven that the blended learning model can improve critical thinking skills. However, in this study the Blended Learning model that researchers used was a Learning Management System (LMS) in the form of Google Classroom as a tool for online learning. Where Google Classroom is an application that allows the creation of classrooms in cyberspace. Google classroom is a google for education feature that can be used in the learning process, both in normal and abnormal situations such as the Covid-19 pandemic. Google Classroom can be a channel for collecting assignments, submitting assignments to assessing submitted assignments. Based on that,

Kowiyah (2012) explains that thinking is a psychological process, moral treatment to gain knowledge, understanding and skills in order to find solutions and decisions deductively and evaluatively according to the stages. Robert H. Ennis in Alec Fisher (2008) reveals that critical thinking is reasonable and reflective thinking that focuses on deciding what to believe and do. Critical thinking is thinking through different ways. The processes and skills involved in making rational decisions are called critical thinking (Sri Diana Putri, 2017).

Ennis in Nani Ratnaningsih (2016) divides critical thinking ability indicators into five groups, namely: 1) providing simple explanations such as focusing questions, analyzing arguments, asking and answering questions, 2) building basic skills such as considering whether sources are reliable or not, observing and considering observation reports, 3) making conclusions such as deducing and considering the results of deductions, inducing and considering the results of induction, making and considering decision values, 4) providing further explanations such as identifying assumptions, and 5) strategies and tactics such as determining an action, connecting facts, data and concepts.

Blended Learning or combined learning is learning that combines direct learning with indirect learning. Dewi (2013) states that Blended Learning is a combination of the characteristics of traditional learning and electronic learning environments. In blended learning, there are two learning models that are combined, namely direct learning or conventional learning and online or online learning.

Ari Susandi (2017) explains that there are three steps of the blended learning model, namely as follows: 1) Seeking information namely the search for information from various sources of information available in ICT (online), books, and delivery through face-to-face in class. 2) Acquisition of information, namely interpreting and combining information personally and communally. 3) Synthesizing of knowledge, namely reconstructing knowledge through the process of assimilation and accommodation starting from the results of analysis, discussion and formulation of conclusions from the information obtained.

2 RESEARCH METHODS

This study aims to see how the blended learning model can improve students' critical thinking skills. This study uses a quantitative approach with the research design used is Quasi Experimental Design. This form involves two groups, the experimental group and the control group. The main characteristic is that the samples used for the experiment as well as the control group were taken randomly from a certain population. This design does not start with a pretest. To determine the effect of the two groups, it is enough to be given different treatments, both groups were given a posttest. Posttest results are used to find out which one is more effective.

The subjects involved in this study were 60 students of class X SMK Merah Putih Bekasi City, namely class X OTKP 1 which amounted to 30 students and class X OTKP 2 which amounted to 30 students. The sampling technique used in this research is Cluster Random Sampling. Cluster random sampling is a sampling technique in which researchers form several clusters from the results of selecting some individuals who are part of a population. Several clusters of this population are then formed based on homogeneous or identical traits or characteristics among certain individuals in a population. In cluster random sampling technique, researchers perform random sampling from various clusters in a population.

In this study, the researcher first made a test instrument in the form of 8 essay questions. The question is then tested for the instrument to meet the requirements of a good test to be used as a research question. The requirements for a good test are: validity test, reliability test, difficulty level test, and different power test. After testing the instrument to determine sufficient and good test questions, it is continued with a prerequisite test of data analysis, namely the normality test to prove that the sample comes from a normally distributed population. The normality test used is the normality test using the Liliefors method. After performing the normality test, then the homogeneity test was carried out. Homogeneity test is used to determine the similarity in each class or group. After the research data is known to be normally distributed and homogeneous, then the hypothesis is tested. The hypothesis test used is the similarity of two averages: two-party test (*t*-test).

3 RESULTS AND DISCUSSION

The data analyzed in this study is data on students' mathematical critical thinking skills after learning by using the Google Classroom-assisted Blended Learning model and the Discovery Learning learning model. The data was taken from 60 students of class X SMK Merah Putih Bekasi City. In accordance with the research problem, the process of data analysis and discussion of the results of this study is focused on explaining the effect of applying the Google Classroom-assisted Blended Learning model on mathematical critical thinking skills in trigonometry material in class X SMK Merah Putih Bekasi City. The description of the results and discussion consists of four parts, namely: instrument testing, normality test, homogeneity test and hypothesis testing.

3.1 Instrument Trial Results

The test results of the instrument include tests of validity, reliability, level of difficulty and discriminatory power. The validity test was carried out on questions from variables (mathematical critical thinking skills) in trigonometry material. Based on the results of the calculations carried out, 7 valid questions were obtained and 1 dropped question. The results of the reliability test based on the results of the calculations carried out obtained the calculation results of 0.756 with categories including questions with a high level of reliability. The difficulty level test is carried out to find out easy, medium, or difficult questions. Based on the calculation results, there are 1 item in the category of easy questions, 5 items in the medium category and 2 items in the category of difficult questions. The discriminatory power test was carried out to determine the ability of the questions to distinguish the high level of intellectual ability of students with low intellectual levels. There are 3 items that have a category of less discriminating power and 5 questions with a category of sufficient discriminating power.

3.2 Data Analysis Prerequisite Test Results

The prerequisite tests for data analysis in this study were the normality test using the Liliefors method, the homogeneity test using the Fisher method, and hypothesis testing using the similarity of two averages: two-party test (*t*-test).

3.2.1 Normality test

The test results on the research sample are used to conclude whether the observed population is normally distributed or not. To find out whether the data is normally distributed or not, the Liliefors distribution test is used with samples from each group to be tested for the null hypothesis (H0) with the comparison hypothesis (H1). With the following conditions: if $L_{obs}<L_{table}$, then the data is normally distributed. If $L_{obs}>L_{table}$, then the data is not normally distributed. For the experimental class, based on calculations obtained L_{obs}=0.1514 while Ltable for n=30 with a significant level of 0.05 is 0.161. The decision to accept H0 because $L_{obs}<L_{table}$, it can be concluded that the data is normally distributed. As for the control class, based on calculations obtained L_{obs}=0,0847 while L_{table} for n=30 with a significant level of 0.05 is 0.161. The decision to accept H0 because $L_{obs}<L_{table}$, it can be concluded that the data is normally distributed.

Table 1. Normality Test

Class	*N*	α	L_{obs}	L_{tabel}	Category
Experiment	30	0.05	0.1514	0.161	Normal
Control	30	0.05	0.0847	0.161	Normal

Table 2 shows that the two class data are normally distributed because they both have $L_{obs}<L_{table}$, therefore it can be concluded that H0 is accepted and H1 is rejected.

3.2.2 Homogeneity Test

The variance similarity test or population homogeneity test of the two groups was performed using Fisher's exact test. From the results of the homogeneity test, the experimental class score variance was 184.36 and the control class score variance was 119.62 then the experimental class score variance was divided by the control class score variance with the provision that the largest score variance was the numerator and the smallest variance score was the denominator.

Based on the calculation results, the F_{count} value is 1.541. The value of Fcount is then compared with F_{table} with *dk* denominator $n-1$ and *dk* numerator $n-1$. So *dk* numerator 29 and *dk* denominator 29 with α=0.05. Based on table of *F*, the value is $F_{0.05(29.29)}=1.86$ and $F_{(0.95)(29.29)}=0.54$. It turns out that F_{count} lies between the value of F_{table} or $0.54<1.541<1.86$. Thus it can be concluded that the variance of the data to be analyzed is homogeneous.

3.2.3 Hypothesis testing

The hypothesis that will be tested in this study aims to explain the effect of applying the Google Classroom-assisted blended learning model on students' mathematical critical thinking skills on trigonometry material in class X SMK Merah Putih Bekasi City. The process of testing the research hypothesis was carried out using the similarity test of two averages: a two-party test through a t-test.

Before looking for the value of tcount, we first look for the combined *S* (standard deviation), from the calculations obtained *t*count of 2.610 and t_{table} at α= 0.05 is 2.001. So, H_0 is rejected and H_1 is accepted. It was found that $t_{count}=2,610>t_{table}=2,001$.

4 CONCLUSION

Based on the results of the hypothesis testing of the t-test, it was obtained that tcount = 2.610 and ttable, namely 2.001 with a significant level of 0.05. From the research, it was found that tcount = 2,610 > ttable = 2,001 and this clearly does not exist in the reception area. So H0 is rejected and H1 is accepted. With the acceptance of H1 from the results of hypothesis testing, it can be concluded that there is an effect of applying the Google Classroom-assisted blended learning model on students' mathematical critical thinking skills in trigonometric comparison material in class X SMK Merah Putih Bekasi City. Thus, the Google Classroom-assisted Blended Learning learning model can help improve students' critical thinking skills, especially in trigonometry material.

5 REFERENCES

Alec Fisher. (2008). Berpikir Kritis Sebuah Pengantar, Jakarta: Erlangga, hlm. 3.

Anggraeni, Anggian. Supriana, Edi. Hidayat, Arif. (2019). "Pengaruh Blended Learning Terhadap Kemampuan Berpikir Kritis Siswa SMA pada Materi Suhu dan Kalor" Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan Vol.4 no.6 Juni.

Ari Susandi. (2017) "The Influence Model Blended Learning of Social Sciences Subjects Respecting Indonesian Ethnic and Cultural Diversity To Increasing Activity and Learning Outcomes of Grade V Students in Elementary School 1 Purwohajo Banyuwangi Distric Year 2015/2016", Jurnal Pancaran Pendidikan, 6(3), hlm. 44

Cahyadi, F.D., Suciati, Probasari, R.M. (2012). "Penerapan Blended Learning Dalam Pembelajaran Biologi Untuk Meningkatkan Kemampuan Berpikir Kritis Siswa". Pendidikan Biologi, 4(1), 15-22.

Dewi S.P, Diana Ariani, and Hilman Handoko. (2013) Mozaik Teknologi Pendidikan E-Lyaiearning. Jakarta: kencana. hlm. 112.

Ghiffar, M. A. Nizamuddin. (2018). "Model Pembelajaran Berbasis Blended Learning Dalam Meningkatkan Critical Thinking Skills Untuk Menghadapi Era Revolusi Industri 4.0 1Muhammad," Prosiding Seminar Nasional Pendidikan, 85–94.

Husamah. 2014. "Pembelajaran Bauran (Blended learning)". Terampil Memadukan Keunggulan Pembelajaran Face-To-Fac, E-learning Offline-Online dan Mobile Learning Jakarta: Prestasi Pustaka Jakarta

Khoiriyah, Nailul. (2018). "Implementasi Pendekatan Pembelajaran STEM Untuk Meningkatkan Kemampuan Berpikir Kritis Siswa SMA Pada Materi Gelombang Dan Bunyi" 5, no. 1: 1-63.

Khotimah, Sofiatul. "Pengaruh Model Blended Learning Terhadap Prestasi Belajar Siswa SMA Negeri 1 Purwokerto Ditinjau dari Berpikir Kritis". Jurnal Ilmiah pendidikan Ekonomi Vol.5 No.2 2020

Kowiyah. (2012). "Kemampuan Berpikir Kritis", Opini, Jurusan Pgsd Universitas Hamka, Jurnal Pendidikan Dasar, Vol.3, No.5, hlm. 175.

Putri, Sri Diana. (2017). "Pengembangan Perangkat Pembelajaran Fisika Berbasis Keterampilan Berpikir Kritis Dalam Problem-Based learning," Jurnal Ilmiah Pendidikan Fisika Al-Biruni 6(1), hlm. 125.

Ratnanigsih, Nani. (2016). "Membangun Keterampilan Berpikir Kritis Matematik Mahasiswa Melalui Pengembangan Media Pembelajaran Interaktif Pada Teori Group", Jurnal Siliwangi, 2.2, 124-30.

Suana, Wayan. Raviany, Mirda. dan Sesunan, Feriansyah. (2019)."Blended Learning Berbantuan Whatsapp Pengaruhnya Terhadap Kemampuan Berpikir Kritis dan Kemampuan Pemecahan Masalah". Gravity: Jurnal Ilmiah Penelitian dan Pembelajaran Fisika Vol.5 no.2 Juli. Page 37-45

Susilowati, Eko. Dewantara, Dewi. Suyidno. Winarno, N. (2021). "Pengaruh Blended Learning Terhadap Keterampilan Berpikir Kritis dan Keterampilan Berpikir Kreatif". Prosiding Seminar Nasional Lingkungan Lahan Basah vol.6 no.1 April 2021