1

The Effect of Blended Learning Models Assisted by Video Tutorials on Students' Critical Thinking Ability in Mathematics Learning

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Abstract

This study aimed to determine students' critical thinking skills on the subject of number patterns using the *Blended Learning* learning model. The research was conducted at MTsN 3 Kerinci, Academic Year 2021/2022. The research method used is a quasi-experimental method with a posttest-only control design. The research instrument used is a critical thinking ability test. The results showed that the critical thinking ability of students who were taught with the *Blended Learning* leraning model assisted by video tutorials had an average score of 8.58, and the class that did not use the *Blended Learning* learning model assisted by video tutorials had an average score of 6.24. Thus, this study concludes that the *Blended Learning* learning model has a significant influence on students' critical thinking ability.

Keywords: *Blended Learning Mode Assisted Video Tutorial; Critical Thinking Ability.*

Abstrak

Artikel ini bertujuan untuk mengetahui kemampuan berpikir kritis siswa pada pokok bahasan pola bilangan dengan menggunakan model pembelajaran *Blended Learning*. Penelitian dilakukan di MTsN 3 Kerinci, Tahun Pelajaran 2021/2022. Metode penelitian yang digunakan adalah metode quasi eksperimen dengan posttest only control design. Instrumen penelitian yang digunakan adalah tes kemampuan berpikir kritis. Hasil penelitian diperoleh bahwa Kemampuan berpikir kritis siswa yang diajar dengan model pembelajaran *Blended Learning* berbantuan video tutorial memiliki nilai rata-rata yaitu sebesar 8,58 dan kelas yang tidak menggunakan model *Blended Learning* berbantuan video tutorial memiliki nilai rata-rata sebesar 6,24. Oleh karena itu, penelitian ini menyimpulkan bahwa model pembelajaran *Blended Learning* mempunyai pengaruh yang signifikan terhadap kemampuan berpikir kritis siswa.

Kata Kunci: *Model Pembelajaran Blended Learning Berbantuan Video Tutorial; Kemampuan Berpikir Kritis.*

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INTRODUCTION

The 2013 curriculum contains several compulsory subjects, one of which is mathematics. Mathematics learning is given to students from basic education to college (Fitriani & Yarmayani, 2018). In Permendikbud No. 21 of 2016, it contains that the competencies that students must have in learning mathematics are to show a logical, critical, analytical, creative, careful and conscientious attitude, responsible, responsive, and not easily to give up in solving problems. Critical thinking skills are part of Higher Order Thinking Skills (HOTS) (Brookhart, 2010; Anderson & Krathwohl, 2010) is a thought process in a higher cognitive level developed from various cognitive concepts and methods and learning taxonomy. According to Newman and Wehlage (Widodo, 2013) which aims to improve the thinking ability of learners especially with regard to the ability to think critically in receiving various types of information at a higher level.

Critical thinking is the process and ability involved in making decisions rationally so that critical thinking must be owned by all learners. Critical thinking is also a basic aspect to understand complex problems through experiential sustainability learning in making and drawing logical conclusions about what actions should be performed and what should be believed or believed. Bensley dan Murtagh (2012) states that critical thinking involves skills, dispositions, and metacognitions related to critical thinking. Beyer (dalam Slavin, 2011) also argues that critical thinking is making reasoned judgments, a disciplined way of thinking that a person uses to assess the validity of something (statements, news, arguments, research, etc.). Critical thinking belongs to the category of skills needed in the face of revolution 4.0. Therefore, in the period of the industrial revolution 4.0 critical thinking skills became essential skills that must be possessed by every graduate at every level of education.

The ability of each student in receiving material is different because this ability is determined by the ability to think in each student (Budiarti, at al., 2017). Critical thinking is one of the most important abilities in the learning process (Huber & Kuncel, 2015) so that students are trained in studying, researching, and

studying things that are necessary. A person who is able to think critically will be able to analyze the problems faced, find and choose the right, logical and useful solutions. When faced with a problem, he will solve it properly. Critical thinking is currently one of the life skills that need to be developed through the educational process.

Currently, students have difficulty in developing their critical thinking skills because the learning provided by teachers is still carried out using conventional methods (Huber & Kuncel, 2015) (Fatmawati, et al., 2014). In addition, the learning carried out is more emphasized on memorization and only reading the material (Hong, et al., 2012). A person's critical thinking ability can be seen from the way he gives opinions with confidence and how to act by giving reasons (Mabruroh & Suhandi, 2017). In the world of learning, students' critical thinking skills need to be developed so that students use their thinking critically to solve a given problem (Mabruroh & Suhandi, 2017). Learning and learning activities will run smoothly and in accordance with learning objectives if the teacher can determine a suitable learning strategy so that learning can run optimally (Dwi et al., 2013; Kartal et al., 2011). In addition, teachers can combine phenomena that occur in everyday life with the learning material to be studied and provide questions to improve critical thinking skills according to their indicators (Kartal et al., 2011).

One of things to be able to know students' critical thinking skills is to provide critical thinking questions in accordance with indicators of critical thinking ability. There are many expert opinions regarding critical thinking indicators, so the authors conclude several indicators to prepare critical thinking questions that are in accordance with the indicators for research. The indicators that the author took refer to the four basic elements revealed by Ennis, namely Inference, Reason, Situation and Overview.

Based on the results of the mathematical critical thinking ability test for class VIII MTsN 3 Kerinci students using the questions in the book conducted by the researcher in April 20, 2021 as many as 4 questions, it can be seen that the mathematical critical thinking ability of class VIII MTsN 3 Kerinci students is

still relatively low. This is shown from the difficulty of students in answering questions in the form of critical thinking skills. From the results of the tests carried out, on average in a class only 10 students out of 19 students are able to answer correctly and according to the indicators of critical thinking ability. Based on the results of the test, it can be concluded that the mathematical critical thinking ability of Class VIII MTsN 3 Kerinci students is still relatively low. The low mathematical critical thinking ability of students is caused by students having difficulty in solving problems or difficulty in finding ways to deal with problems.

The results of the critical thinking ability test are also supported by the results of the author's observations and interviews with one of the mathematics teachers at MTsN 3 Kerinci, which shows that the process of learning mathematics in the classroom is still teacher-centered. The learning model used still uses conventional methods or that may make learning still less than optimal. According to Russefendi (2003) most mathematics is given in schools through conventional explanations from teachers so as to make students passive. Based on the results of the study, it was found that most students also still have difficulty in solving problems, developing their thinking patterns and there are still many students who like to cheat on their friends' answers and students' participation in learning is still low. In this regard, it is necessary to improve and update learning in order to improve students' mathematical critical thinking skills by creating active, creative, effective and enjoyable learning conditions for students through learning models that are appropriate and in accordance with student characteristics. One of the appropriate learning models used so that students have the ability to think critically is the application of the Blended Learning learning model.

The selection of a Blended Learning learning model as an effort to improve students' critical thinking skills is based on the results of the author's interview with one of the mathematics teachers at MTsN 3 Kerinci, namely during the Covid-19 pandemic, the learning process became less than optimal because the learning process used online-based Information and Communication

Techniques (ICT). Therefore, the Blended Learning learning model can be used as a solution in an effort to improve students' critical thinking skills.

Blended Learning model is learning that combines face-to-face learning with online learning. Blended Learning is able to improve the ability to use ICT and students can also collaborate, ask questions, and think critically in the use of well-planned Blended Learning. The application of the Blended Learning model is thought to be necessary because it is supported by existing ICT facilities in schools, where students, educators, and school employee staff, most of whom already have facilities to access the internet properly so that the Blended Learning model can be implemented properly.

Blended Learning is one of the alternative aspects of learning strategies that can be used by teachers in the current era of globalization (Aslam, 2015). This is because Blended Learning can be done by teachers anywhere and anytime (Alonso, et al., 2005), so that the use of Blended Learning can increase students' knowledge (Alonso, et al., 2005). The application of the Blended Learning learning model by teachers certainly has several advantages.

Some of the advantages of Blended Learning applied by teachers are such as Online learning. Online learning can help students to be able to learn independently without direct teacher guidance, help conventional learning that is often done by teachers so as to help students obtain information without having to meet face to face with the teacher (Anggraini, et al., 2016), increase students' curiosity towards information, flexible learning, and can reduce the costs used in the learning process in general (Garnham & Kaleta, 2010). In addition, students can learn in their respective learning speeds without being influenced by their friend (Yapici and Akbayin, 2012).

Previous research has resulted in that blended learning models can affect student learning outcomes (Wong et a., 2014; Kurniawan, 2014; Sudiarta & Sadra, 2016), improving student learning outcomes (Ceylan & Kesici, 2017). Blended Learning is also proven to improve students' critical thinking skills and can train students' critical thinking skills (Sari, 2013). In carrying out learning with Blended Learning, teachers can take advantage of the WhatsApp application.

The WhatsApp application is suitable for novice online students because its operation is very simple, easily accessible to students, and for students whose network area or signal is not good. However, to anticipate students who do not understand or understand the lessons explained by the teacher on WhatsApp, teachers can take advantage of media use, for example in the form of video tutorial media (Fitriani & Ikhsan, 2017).

Learning using video tutorials in MTsN 3 Kerinci has never been done before. Based on the author's interview with one of the math teachers at the school, he said that the teachers still don't understand how to make tutorial videos and don't have free time to learn them and make them. Therefore, the author took the initiative to try applying the Blended Learning learning model assisted by video tutorials to see student responses and the influence of students' critical thinking skills before or after being applied.

According to Sumantri (2019), video tutorials are the presentation of information both learning materials and the process of operating a system packaged in the form of videos. The use of video tutorials in learning aims to prevent teachers from having to explain the teaching material repeatedly, but simply present the videos that have been made so that the teacher's focus can be directed to the development and deepening of the material (Ekawati, Supurwoko & Wahyuningsih, 2017). The tutorial videos used by researchers are by utilizing tutorial videos that are already on Youtube.

The background above makes the author interested in conducting research on the influence of the Blended Learning Model assisted by video tutorials on students' critical thinking ability in Mathematics learning.

RESEARCH METHODS

The research was conducted using a quasi-experimental research design. This type of research is quantitative research. This research consists of two classes, namely the experimental class and the control class, experimental class students who have participated in learning using the Blended Learning model assisted by video tutorials and control classes that do not use the Blended

Learning learning model assisted by video tutorials successively then take the test. Tests conducted by students to measure students' critical thinking ability on class VIII mathematics material. Students answer every question given by the teacher based on indicators of critical thinking ability.

The independent variable in this study is a Blended Learning model assisted by video tutorials. Free variables are variables that can affect bound variables in a study. The dependent variable that is cognitive in this study is the critical thinking ability of students. Bound variables are variables that can be affected by free variables.

The population of this study was all students of class VIII MTsN 3 Kerinci which amounted to 53 people consisting of three classes, namely class VIII A totaling 17 people, VIII B totaling 17 people, and VIII C totaling 19 people. The sample of this study was taken based on purposive sampling techniques, where the experimental class and control class were selected by the teacher directly considering that there was no superior class where the academic average score of students in the class was higher than other classes. So the two selected sample classes have the same academic average score of the students. The research sample was 34 students of class VIII, namely class VIII A as many as 17 people and class VIII B as many as 17 people.

This critical thinking ability test instrument was given to students of class VIII MTsN 3 Kerinci who were sampled for both the control class and the experimental class. The test instruments in this study have been tested for validity, reliability, differentiating power, and difficulty level so that they are suitable for use as a data collection tool. To facilitate the calculation of researchers use the help of Anates Software.

The test carried out uses four test questions designed based on indicators of critical thinking ability. This study used an active participation type of observation. The interviews in this study were in the form of semi-structural interviews. Semi-structured interviews are used to obtain a more open one, where the informant is asked for his opinion, and his ideas are related to the problem. In this study, interviews were conducted using interview guidelines. The interview

guidelines were validated by two Mathematics Education Lecturers and two Mathematics Teachers. The purpose of the interview activity is to find out in depth about the influence of the Blended Learning learning model on the ability to think critically in mathematics learning. The resource person in this interview was a mathematics teacher of MTsN 3 Kerinci.

Analysis of research data was tested using the average difference test. Before the average difference test is carried out, a prerequisite test is first carried out which consists of a normality test and a homogeneity test. The purpose of conducting a normality test is to see whether the data is distributed normally or not. The homogeneity test is carried out to see whether the data has a homogeneous variance or not. As for what is done to see how much influence the application of the Blended Learning learning model has on students' mathematical critical thinking ability, the author uses a t-test because the data tested is normally distributed and has homogeneous variances. In data analysis, researchers use the SPSS application for prerequisite tests, which consist of a normality test and a homogeneity test for the average difference test.

The research process or procedure that will be carried out on the application of the Blended Learning model to the critical thinking ability of Class VIII MTsN 3 Kerinci students is explained with the chart below:
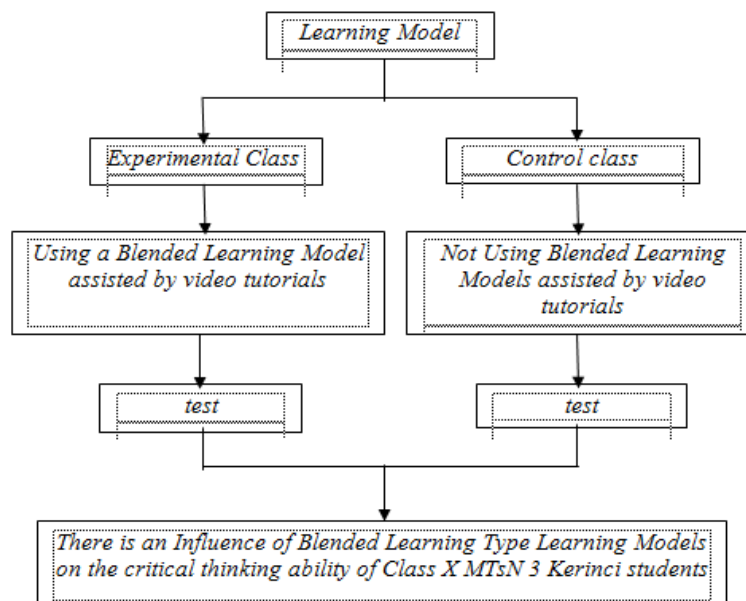

Figure 1. Recearch Procedure

The video tutorials used in this study can be seen on the https://youtu.be/Ky-7-1qbmLA page. The initial display image of the tutorial video is as follows:

Figure 2. Initial View of Video Tutorials

The video tutorial contains an explanation of the Number Pattern material that can be accessed by students anytime and anywhere. Researchers as teachers instruct students to download tutorial videos at school because schools have a wireless network available so that students can look back at tutorial videos at home as a form of repetition of learning at home, especially during Online learning as a result of the Covid-19 outbreak. One of the material displays in the tutorial video is as follows:

Figure 3. Material Display in Video Tutorials

RESULTS AND DISCUSSION

This research was carried out as many as four meetings in experimental classes using the Blended Learning learning model assisted by video tutorials and control classes that did not use the Blended Learning learning model assisted by video tutorials. The data obtained in this study are data collected from tests given to MTsN 3 Kerinci students in the form of critical thinking ability test tests in both classes, namely the experiment class and the control class. The instruments used are four essay questions that have been validated by two mathematics teachers and two mathematics lecturers.

The test results given to classes that do not use the Blended Learning learning model assisted by video tutorials that do not use the Blended Learning learning model assisted by video tutorials have the lowest score is 2 and the highest score is 12. The test results given to the experimental class have the lowest score is 3 and the highest score is 12. For more details, the data on the results of the control class critical thinking ability test are presented in the form of the following frequency distribution table:

Table 1. Frequency Distribution of Students' Critical Thinking Ability

Class	Interval	Frequency		
		Absolute	Cumulative	Relative (%)
Control	1 – 4	3	3	17,65 %
	5 – 8	10	13	58,82 %
	9– 12	4	17	23,53 %
	Sum	**17**		**100 %**
Experimental	1 – 4	2	2	11,77 %
	5 – 8	5	7	29,41 %
	9 – 12	10	17	58,82 %
	Sum	**17**		**100 %**

Based on Table 1, a mean value of 6.24 is obtained, a median of 6, and a mode of 5. The distribution of critical thinking skills in the control class is not too large, indicated by a variance score of 5,941 and a standard deviation score of 2,437. The number of students at each interval of the control class that the author studied fluctuated with the lowest frequency at the interval of grades 1 – 4 as

much as 17.65% which was 3 students. While the highest frequency is found in the interval of grades 5-8 as much as 58.82%, which is 10 students. The data shows that the gain of value at each interval is volatile. Students who have mathematical critical thinking skills below the average are 12 people or 70.59%, while students who have mathematical critical thinking skills above the average are 5 people or 29.41%.

Based on the results of the data calculations in Table 1, a mean value of 8.58 was obtained, a median of 9, and a mode of 9. The distribution of critical thinking skills in the experimental class is not large enough, indicated by a variance score of 7,765 and a standard deviation score of 2,787. The number of students at each interval of the control class that the author studied fluctuated with the lowest frequency at the interval of grades 1 – 4 as much as 11.77% which is two students. While the highest frequency is found in the interval of grades 9-12 as much as 58.82%, namely ten students. The data shows that the gain of value at each interval is volatile. Students who have mathematical critical thinking skills below the average of four people or 23.53%, while students who have mathematical critical thinking skills above the average are 13 people or 76.47%.

Based on the description of the critical thinking ability of experimental class students and the critical thinking ability of control class students, it can be seen that there are differences. To further clarify the difference in critical thinking ability between the experimental class and the critical thinking ability of the control class students can be seen in the following table:

Table 2. Students' Critical Thinking Ability

Statistical	Class	
	Experimental	Control
Number of Students	17	17
Highest Score	12	12
Lowest Score	3	2
Mean	3,58	6,24
Median	9	6
Mode	9	5
Variance	7,765	5,941
Standard Deviation	2,787	2,437

Table 2 above shows the difference in descriptive statistical calculations between the two classes. From Table 2, it can be seen that the average score of the experimental class is higher than the average score of the control class. The highest student scores are indeed from the two classes with a score of 12, but the lowest score is in the control class with a score of 2. It means that the highest individual critical thinking ability is found in both classes while the lowest individual critical thinking ability is found in the control class. The following is a picture of the recapitulation of data from the student critical thinking ability test (Figure 4).
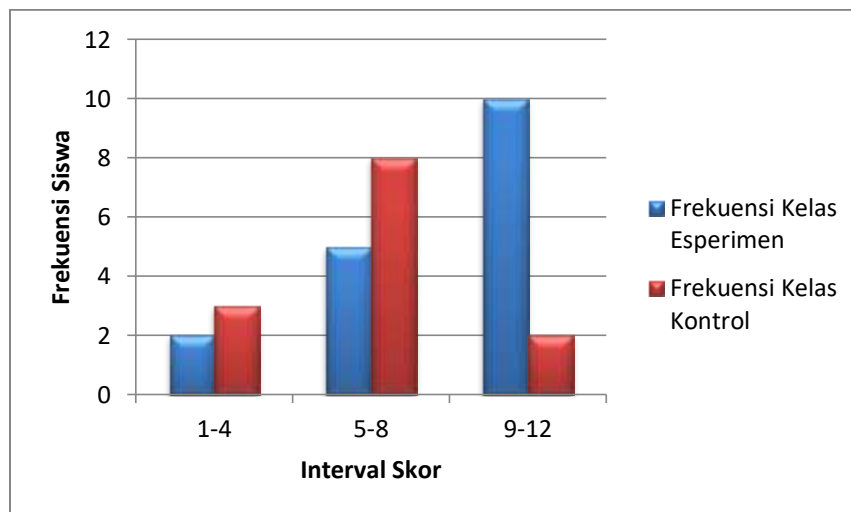

Image 4. Bar Chart Distribution of Critical Thinking Proficiency Test Scores

From the data distribution of the two classes, it can be seen that the experimental class has a more heterogeneous distribution because it has a greater variance value and standard deviation from the control class. This means that the critical thinking ability of the experimental class is more varied and spreads towards the average class, while the critical thinking ability of the control class is more clustered and tends to be the same.

A normality test is performed to find out whether the data is distributed normally or not. The normality test is used on a data, namely the test of critical thinking ability of the experimental class and the control class. This data normality test uses the Shapiro Wilks test with the help of Software Statistical Product and Service Solutions (SPSS). Normal distributed data when the sig value > 0.05 (5%) then H_0 is accepted. Based on the Shapiro Wilk normality test at a

significant level of 0.05, a sig value was obtained. 0.143 critical thinking ability test in the experimental class and obtained a sig score. 0.140 critical thinking ability test on the control class. Conclusions are drawn from the terms of testing the hypothesis of normality, that is, if sig. > 0.05 then H_0 is received so that the data is normally distributed. Both classes obtained sig grades. the test is more than a significant level (0.05), then it can be concluded that the distributed data is normal.

The homogeneity test is carried out to find out whether the two classes have homogeneous (equal) critical thinking abilities or not. The homogeneity test is used in a data, namely the critical thinking ability test of the experimental class and the control class. This data homogeneity test uses the Lavene test with the help of Statistical Product and Service Solutions (SPSS) software. The data is expressed homogeneous or the same if the sig value. > 0.05 then H0 is received, the data is stated to have the same variant (homogeneous). Based on the Lavene Statistic homogeneity test at a significant level of 0.05, a sig value was obtained. 0.599 of the critical thinking ability tests in the experimental class and the control class. Conclusions are drawn from the terms of testing the homogeneity hypothesis, that is, if it is a sig. $\geq$ 0.05 then H0 is received so that the data has a homogeneous or equal variant. Both classes obtained sig grades. the test is more than a significant level (0.05), then it can be concluded that the data variants in both classes are homogeneous or the same.

Based on the normality and homogeneity test, the test data of the critical thinking ability is normally distributed and has homogeneous (same) variants. Therefore, hypothesis testing uses parametric statistical analysis in the form of t-test through SPSS Software. The data from the calculation of the test hypothesis test can be seen in Table 3 below:

Table 3. T-test Calculation Results

t-test	Result
Sig. (2-tailed)	0,018
Taraf Signifikan (∞)	0,05
Conclusion	**H_0 rejected**

Based on hypothesis tests using a t-test at a significant level of 0.05, a sig value was obtained. (2-tailed) critical thinking ability test result data of both classes. Conclusions are drawn based on the terms of hypothesis testing, that is, if if sig. (2-tailed) > 0.05 then H0 is accepted and H1 is rejected and if sig. (2-tailed) < 0.05 then H0 is rejected and H1 is accepted. Table 3 shows that the sig value. (2-tailed) data on the results of the critical thinking ability test, which is 0.018 so that it can be concluded that there is a difference in the average test of students' critical thinking ability tests in the experimental class and the control class.

In learning that does not use Blended Learning, students are still passive when learning takes place because learning is teacher-centered. Student activities in classes that do not use Blended Learning only record the teacher's explanation and work on LKS by referring to the material described by the teacher. After conducting research, it was obtained that classes that do not use Blended Learning have low critical thinking skills. In the final test, critical thinking skills for classes that do not use Blended Learning assisted by video tutorials consist of 4 description questions consisting of 4 critical thinking indicators.

The first indicator of critical thinking is situation, there is one question item that measures this indicator, namely question item number 4. Problem number 4 is to find patterns from triangular number patterns from problems related to everyday life. The critical thinking expected of this problem is that students are able to solve problems according to the context of the problem and are able to solve mathematical problems that are applied in everyday life. In question number 4, most of the class students who use the Blended Learning learning model assisted by video tutorials answer incorrectly.

The second indicator of critical thinking is reason, there is one question item that measures this indicator, namely question item number 2. Question number 2 is to find the 20th tribe by giving reasons about the answers put forward. The critical thinking expected of this question is that students are able to give reasons about the answers put forward. In question number 2, most of the class students who use the Blended Learning learning model assisted by video tutorials answer incorrectly.

The third indicator of critical thinking is an overview, there is one question item that measures this indicator, namely question item number 1. Problem number 1 is to find the 300th term on the square number pattern by considering and concluding. The critical thinking that is expected from this question is that students can check or check what has been stated, considered, learned, and concluded. In question number 1, most of the class students who use the Blended Learning learning model assisted by video tutorials answer incorrectly.

The fourth indicator of critical thinking is inference, there is one question item that measures this indicator, namely question item number 3. Problem number 3 is to find three even bilanngans whose number is equal to 90. The critical thinking that is expected from this question is that students are able to make conclusions from information accompanied by adjustment steps. In question number 1, most of the class students who use the Blended Learning learning model assisted by video tutorials answer incorrectly.

The results of this study show that learning that does not use the Blended Learning learning model assisted by video tutorials is less effective in improving students' critical thinking skills. In general, the results obtained through this study are that it turns out that learning that does not use the Blended Learning learning model assisted by video tutorials in mathematics learning is less able to improve students' critical thinking skills. This can be seen from the results of the analysis of research data that those who do not use the Blended Learning learning model assisted by video tutorials get an average score of low-key critical thinking ability of students. The average test result of students' critical thinking ability in this study for classes whose learning did not use the Blended Learning learning model assisted by video tutorials was 6.24.

The low value of critical thinking ability of class students who do not use the Blended Learning learning model assisted by video tutorials is due to the learning process that tends not to emphasize students being involved individually, so that students are not called to study the material in depth to get maximum results. This is in line with Paulo Freire's theory which says that in conventional learning patterns education is termed a bank, where students are filled and

crammed with a variety of subject matter where students only accept everything that the teacher gives without other critical activities. So that students become passive because learning is still teacher-centered. Thus it can be concluded, the conventional model is not large enough in improving students' critical thinking ability.

The Blended Learning learning model is a combination of online and face-to-face learning. In Blended Learning, the main focus is that students are expected to be independent to be able to take responsibility and complete their learning. After conducting research, it was obtained that the Blended Learning learning model based on video tutorials has a fairly high score. There are several things that cause students' critical thinking ability in the classroom that uses the Blended Learning learning model assisted by higher video tutorials. The most important thing is because of the learning process in the classroom. The learning process with Blended Learning makes students more motivated to be able to carry out learning activities independently, where students often ask questions in discussion forums with teachers and with other students.

The problems used in blended learning assisted by video tutorials are real and interesting problems that stimulate students to ask questions from various perspectives. During the learning process, it also makes students more active and critical, students can freely argue with each other and exchange ideas between students and students with teachers. This has an impact on increasing students' mathematical critical thinking skills.

The first indicator of critical thinking is situation, there is one question item that measures this indicator, namely question item number 4. Problem number 4 is to find patterns from triangular number patterns from problems related to everyday life. The critical thinking expected from this problem is that students are able to solve problems according to the context of the problem and are able to solve mathematical problems that are applied in everyday life. In this question, the majority of class students who use the Blended Learning learning model assisted by video tutorials answer correctly.

The second indicator of critical thinking is reason, there is one question item that measures this indicator, namely question item number 2. Question number 2 is to find the 20th tribe by giving reasons about the answers put forward. The critical thinking expected of this question is that students are able to give reasons about the answers put forward. In question number 2, most of the class students who use the Blended Learning learning model assisted by video tutorials answer correctly.

The third indicator of critical thinking is an overview, there is one question item that measures this indicator, namely question item number 1. Problem number 1 is to find the 300th term on the square number pattern by considering and concluding. The critical thinking that is expected from this question is that students can check or check what has been stated, considered, learned, and concluded. In question number 1, most of the class students who use the Blended Learning learning model assisted by video tutorials answer correctly.

The fourth indicator of critical thinking is inference, there is one question item that measures this indicator, namely question item number 3. Problem number 3 is to find three even bilanngans whose number is equal to 90. The critical thinking that is expected from this question is that students are able to make conclusions from information accompanied by adjustment steps. In question number 1, most of the class students who use the Blended Learning learning model assisted by video tutorials answer correctly.

The results of this study show that learning using a Blended Learning learning model assisted by video tutorials is effective in improving students' mathematical critical thinking skills. When the Blended Learning learning model assisted by video tutorials is used as a learning model in mathematics, the focus of learning activities is entirely on students, namely thinking about understanding the material contained in the given tutorial video and then being able to conclude the given material. Thus it can be understood that in Blended Learning assisted by video tutorials students will be more critical and active in the learning process. So learning with the Blended Learning learning model assisted by video tutorials shows a significant influence on improving students' critical thinking skills.

By using the Blended Learning learning model assisted by video tutorials, students are more confident when solving number pattern problems, look more enthusiastic so that they can improve students' mathematical critical thinking skills and can be used as an alternative to improve the quality of learning that may be carried out in class. In addition to the subject matter of number patterns, the Blended Learning learning model assisted by this video tutorial can also be applied to other materials.

In general, the results obtained through this study are that it turns out that the application of the Blended Learning learning model assisted by video tutorials in mathematics learning has been able to improve students' critical thinking skills. This can be seen from the results of data analysis, namely students who learn using the Blended Learning learning model assisted by video tutorials get an average score of higher critical thinking ability. The average test result of students' critical thinking ability for classes whose learning uses the Blended Learning learning model assisted by video tutorials is 8.58. Thus, it can be concluded, the Blended Learning model assisted by video tutorials is able to improve students' critical thinking skills. In line with the theory of Wong, et al (2014) who said that Blended Learning can affect student learning outcomes. Blended Learning is also proven to improve students' critical thinking skills and can train students' critical thinking skills (Sari, 2013).

Based on the results of the analysis of students' critical thinking ability in the classroom who do not use the Blended Learning learning model assisted by video tutorials, it can be seen that there are differences in the learning process and student value acquisition when compared to and the critical thinking ability of students in the classroom who use the Blended Learning learning model assisted by video tutorials. In learning that does not use Blended Learning, students are still passive when learning takes place because learning is teacher-centered. Student activities in classes that do not use Blended Learning only record the teacher's explanation and work on LKS (students' worksheet) by referring to the material described by the teacher. After conducting research, it was obtained that classes that do not use Blended Learning have low critical thinking skills.

Meanwhile, learning that uses the Blended Learning learning model assisted by video tutorials focuses mainly on student independence and a sense of responsibility in following the learning process by solving problems well. After conducting research, it was obtained that the Blended Learning learning model assisted by video tutorials has a fairly high student score gain.

The final test of mathematical critical thinking skills for classes learning with a Blended Learning model assisted by video tutorials consists of four description questions consisting of four critical thinking indicators. In critical thinking indicators, both situation, reason, overview, and inference, most of the class students who do not use the Blended Learning learning model assisted by video tutorials give incorrect answers, but students in classes that use the Blended Learning learning model assisted by video tutorials provide answers correctly.

The results of this study show that learning using the Blended Learning learning model assisted by video tutorials is more effective for improving students' critical thinking skills compared to learning that does not use the Blended Learning learning model assisted by video tutorials. In the Blended Learning learning model assisted by video tutorials, the focus of learning activities is entirely on students, namely thinking about understanding the material contained in the given tutorial video and then being able to conclude the material provided. However, in classes that do not use the Blended Learning learning model, students only accept and copy what the teacher gives them. Thus it can be understood that in Blended Learning assisted by video tutorials students will be more critical and active in the learning process. So learning using the Blended Learning model assisted by video tutorials shows a significant influence in improving students' critical thinking skill..

In general, the result of this study is that it turns out that the application of the Blended Learning learning model assisted by video tutorials in mathematics learning has been able to improve students' critical thinking skills. This can be seen from the results of the analysis of research data that the average test result of students' critical thinking ability in classes whose learning uses the Blended Learning learning model assisted by video tutorials is 8.58 and classes whose

learning does not use the Blended Learning learning model assisted by video tutorials is 6.24. Classes that use the Blended Learning learning model assisted by video tutorials get a higher average score for students' critical thinking ability than classes that do not use the Blended Learning learning model assisted by video tutorials. The higher results of the critical thinking ability of class students who use the Blended Learning learning model assisted by video tutorials are also caused by several things, including: 1) the training of students in constructing their knowledge in understanding the material in depth during learning, and 2) The enthusiasm and interest of students in the experimental class diving the learning process. This is in line with the theory of Yasar, et al (2014) which says students' critical thinking skills have improved significantly with Blended Learning learning. Thus it can be concluded, the Blended Learning model assisted by video tutorials is better in improving students' critical thinking skills compared to those that do not use the Blended Learning model assisted by video tutorial.

CONCLUSION

Based on the results of the research and discussion, conclusions were obtained, namely: (1) the mathematical critical thinking ability of students who were not taught using the Blended Learning learning model assisted by video tutorials obtained an average test score of 6.24 with students' critical thinking ability below the average of 70.59% and above the average of 29.41%; (2) students' mathematical critical thinking ability taught using the Blended Learning learning model assisted by video tutorials obtained an average test score of 8.58 with students' critical thinking ability below the average of 23.53% and above the average of 76.47%; and (3) there is an influence of mathematics learning with a Blended Learning learning model assisted by video tutorials, based on the independent sample t test obtained a significant value (2-tailed) of 0.018.

Furthermore, researchers are expected to be able to apply blended learning models assisted by video tutorials on other materials other than number patterns in mathematics. Then, the next researcher can also develop this research by looking at the influence of the Blended Learning learning model in improving other

mathematical thinking skills, especially on high-order thinking skills (HOTS). Furthermore, researchers are also advised to continue this research by combining the Blended Learning learning model with other relevant learning models.

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