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MATHEMATICS EDUCATION LEARNING AND TEACHING

Influence of Application of Blended Learning Models with Video Conferences Media on Students' Mathematical Communication Skills

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article info	abstract
	Students' mathematical communication skills are an important element so that students are able to construct their own abilities in mathematics learning. In order for mathematical learning goals to be achieved, teachers must be able to create effective and efficient mathematical learning with the right learning model to be able to provide opportunities and encourage students to practice their mathematical communication skills. The purpose of this research is to find out the influence of the application of blended learning models with conferennces video media on students' mathematical communication skills. This learning model was tested on cirebon veteran vocational school students using experimental classes, namely grade 12 AKL as many as 20 students with a pre-test-post-test one group design. Data collection techniques in this study through tests and questionnaires. The data analysis techniques used are the T-Test paired sample test, the N-Gain test and the simple linear regression equation test with the help of SPSS. The results of this study showed an improvement in students' mathematical communication skills after the application of blended learning models with video conferences and there was a significant positive influence.

INTRODUCTION

Based on the rapid progress of globalization, we need to improve the quality of learning, to achieve good quality learning, not to be obtained casually, of course there is a teaching and learning process. If there is communication between teachers and students, as well as between students, then the teaching and learning process will take place. Students are taught how to hone their talents so that they can build their own strengths through learning exercises. Good learning also needs to be applied in the learning of mathematical sciences. The role of mathematics is the parent of science that must be able to produce human resources who have superior character and are ready to compete (Anike & Handoko, 2018). According to (Supriadi, 2018). Mathematics is an organized structured science. Mathematics is one of the basic sciences and an important science to form an individual mindset and attitude. To train students' abilities to be able to construct their own abilities in learning mathematics, good mathematical communication skills of students are needed.

According to the 2006 Regulation of the Minister of National Education concerning competency standards for passing the field of study, mathematical communication is one of the objectives of mathematics learning and one of the competency criteria for elementary to secondary school graduates (Asri, K., & Permana, 2017) Students are required to be able to communicate ideas through symbols, tables, diagrams, or other media to describe situations or problems as a result of learning mathematics. Mathematical communication skills are an important ability possessed by students where this ability is the ability to read math problems, interpret, interpret a graph, interpret and be able to use mathematical concepts correctly in delivery through arguments either delivered orally or in writing and has been formulated by the National Council of teachers of Mathematics. Mathematical communication skills are one of the factors that affect students' mathematics learning outcomes, if students' mathematical communication skills are of low standards, learning outcomes will be low because students are mostly passive in learning (Husnah & Surya, 2017) Mathematical communication skills are also very important and excellent in the process of learning mathematics (Perwitasari & Surya, 2017).

Data from the IFLS (Indonesia Family Life Survey) in 2000, 2007, and 2014, representing 83% of the Indonesian population, revealed a mathematical crisis. More than 85% of elementary school graduates, 75% of junior high school graduates, and 55% of high school graduates can only answer questions that are suitable for students in grades 2 and below. Few people are able to solve math problems in grades 4 and 5 (Kompas, 2018). shows that mathematics skills in Indonesia are very worrying. Based on the results of the TIMSS (Trends in International Mathematics and Science Study) survey, it also shows that the ability to learn mathematics for Indonesian students is still below the international average. TIMSS survey results (Mulyo et al., 2019) what Indonesian students achieve is that 400 are in the low category, still do not meet and are very far from the advanced category that must achieve a score of 625. The Indonesian government always strives to solve the above problems, one of which is by improving the 2013 curriculum so that the quality of education has improved (Rizkianto & Santosa, 2017). Emphasizing the importance of communication is one of the advantages contained in the 2013 curriculum (Robiana & Handoko, 2020).The current reality shows that students' mathematical communication skills are still low. Based on the results of observations at SMK Veteran Cirebon, it was found that students have not been able to communicate mathematical ideas well. Students have not been able to convey their ideas. When the teacher asks, students are still not able to structure arguments well due to lack of good discussion, students are also not able to state a situation or problem into the form of symbols, diagrams, or models. Mathematical. Thus, it can be said that students' mathematical

communication skills are still low. Low mathematical communication skills are also shown in research studies (Aminah et al., 2018). states that 4 out of 5 indicators of mathematical communication ability studied, are still relatively low. As for the results of the study (Wijayanto et al., 2018) shows that communication skills are low in terms of 2 indicators, namely explaining mathematal ideas into the form of images and stating daily events in mathematical symbols and their completion, from five 5 indicators studied.

In order for these problems to be overcome, a mathematical learning model is needed that can make learning meaningful, so that students' mathematical abilities can be improved, namely with a blended learning model. Basically, the learning model is a form of learning that is depicted from beginning to end which is presented uniquely by the teacher (Irmalia, 2001). In this blended learning model, it combines offline online learning with face-to-face learning, where online learning really requires direct or face-to-face learning to provide feedback between teachers and students. Learning with the development of technology with a combination of face-to-face learning can produce an effective and efficient learning. This learning model is balanced between face-to-face and online learning, namely by using multimedia-type learning media that is loaded on computers, cellphones, video confections and other technological media.

In this blended learning model, it combines offline online learning with face-to-face learning, where online learning really requires direct or face-to-face learning to provide feedback between teachers and students. Learning with the development of technology with a combination of face-to-face learning can produce an effective and efficient learning. The instructor's responsibilities for implementing technology-based learning include timely arrangements for providing real-world feedback, preparation of teaching materials, and monitoring student progress(Udin et al., 2022). This learning model is balanced between face-to-face and online learning, namely by using multimedia-type learning media that is loaded on computers, cellphones, video confections and other technological media (Haqq, A. A., Krisnanto, A., & Darwan, 2021; Haqq, Rochmad, et al., 2022) Determining the right methods and media also needs to be considered in the blended learning model. One of the media that complies with this is video conferencing media.

The use of appropriate media applications such as video conferences will result in an organized learning process so that comprehensive student skills develop because students can be actively involved in participating in ongoing learning (Nasrudin et al., 2021).Through video conference media, teaching staff with students can communicate even remotely and in different places and also students can be equipped with face-to-face learning that allows for problems in online learning materials. In this media, students are also expected to be able to help each other, discuss each other and be able to re-communicate the material that has been delivered to hone the knowledge they are good at and close gaps in their respective understandings, so that the achievement of competencies can be comprehensive in all students and can improve the ability of students' mathematical communication. There are many platforms found in video conferences including Zoom Clouds Meeting, Lifisize, Join.me, Google Meet etc. on research using the google meet platform.

Google Meet est une plate-forme émise par Google qui permet l'interaction entre les enseignants et les étudiants tels que le face à face avec une capacité d'appel vidéo avec plus de 25 utilisateurs. Rencontre Google meet is a platform issued by google that allows interaction between teachers and students such as face-to-face with video calling capacity with more than 25 users. Google meet characteristics that are convenient to use by its users because participants can easily join the meeting by using an invitation shared by the forum organizer (Guru) to email or mobile devices both android and IOS. Where the

meeting invitation code can also be shared on the phone number or copied to be shared on the whatsapp application (Sawitri, 2020).

Based on the previous description, the purpose of this study is to determine the influence of the application of the blended learning learning model with video conference media on students' mathematical communication skills and to find out student responses in mathematics learning after the application of the Blended Learning learning model with Video Conferences media.

METHODS

This type of research uses a type of experimental research using a quantitative approach, because the data to be processed in the study is related to values or numbers whose results can be calculated and processed mathematically (Rizqi et al., 2018).

Population and Sample

Population is the entire object/subject in the study. The population in this study was all grade 12 students at SMK Veteran Cirebon City. A sample is part of the number and characteristics possessed by the population. The sample used in this study was grade 12 AKL (*Akuntansi Keuangan Lembaga* – Institutional Financial Accounting) students as an experimental class. Researchers took samples using the Simple Random Sampling technique. This technique is a technique of randomly sampling from members of a population without regard to the strata present in that population (Sugiyono., 2017). Researchers chose one class from the population to be used as an experiment class because the design in this study was One Group Pretest Postest Design, which is a research design that describes the comparison of the influence of a variable on certain variables in a group (Robiana & Handoko, 2020). Therefore, in this study, only one class was used, namely the experimental class.

Research Design, Site, and Participants

This research was conducted at SMK Veteran Cirebon which is located on Jalan Pemuda No. 33 Sunyaragi village, Kesambi district, Cirebon City. The researcher chose the research site because based on preliminary studies conducted earlier, researchers are quite aware of students' low mathematical communication skills and the need to improve students' mathematical communication skills. This school has also not been optimized by teachers regarding the application of blended learning models with video conferencing media that can be used anywhere and anytime

Research Design

The research design that researchers use is One Group Pretest Postest Design, which is a research design that describes the comparison of the influence of a variable on certain variables in a group. Therefore, in this study, only one class was used, namely the experimental class. The One Group Pretest-Postest Design there is a group that is given treatment, then intends to compare the state before with after being treated. Thus the results of the treatment can be known more accurately.

Data Collection and Analysis

There are two types of data collection techniques used, namely tests in the form of description tests to measure students' mathematical communication skills before and after the application of blended learning learning models with video conference media and filling out questionnaires in experimental classes. The test instruments and questionnaires used previously were validated by experts and tested in the same school

with different classes, namely grade 12 BDP (*Bisnis Daring dan Pemasaran* - Online Business and Marketing) consisting of 22 students. After conducting the trial, the student's score in the test instrument trial is processed and then tested for the validity of each question item and the difficulty level is sought, distinguishing power, and reliability of the question. Students' mathematical communication skills in the form of testing the effectiveness of blended learning learning models with video conference media using paired sample t tests and N-Gain tests on pretest and posttest results of students' mathematical communication skills. The influence test of the blended learning model with video conference media was analyzed using a simple linear regression test and a determination test based on the results of the media response questionnaire and posttest values to determine the influence of the application of the blended learning model with video conferences media on students' mathematical communication skills.

RESULT AND DISCUSSION

Description of test result

In this study, researchers used two instruments, namely questionnaires and tests. Questionnaires and tests have been validated by validators. The questionnaire is a student response questionnaire consisting of 25 statements with 6 indicators used to obtain student responses to the application of a blended learning learning model with video conference media, and a test consisting of 5 questions in the form of a description is used to measure students' mathematical communication skills early (pretest) and end (posttest). Before pretesting and posttest, the test was tested first in grade 12 BDP SMK Veteran Cirebon city and has gone through the stages of testing validity, reliability, difficulty level, and differentiability. This research was conducted in one class, namely the XII AKL experimental class. The experimental class is a class that is given learning treatment by applying a blended learning learning model with video conference media in the learning process. The experimental class consists of 20 students. At the beginning and at the end of the lesson, pretests and posttests are carried out, for experiment classes. Then at the end of the learning, a questionnaire was distributed to find out the blended learning model with video conference media in learning.Based on the results of the pretest and postest, the researcher analyzed the scores obtained. The analysis used is to use the paired sample t-test and the normality gain test. Through the paired sample t-test the mean value for the pretest obtained a value of 36.50 and the mean value for the postest obtained a result of 70.95. From this acquisition, the difference in the mean value of 34.45 shows an increase from the pretest value to the postest value. The sig value of 0.000 < 0.05 there is a difference that Significant between the initial variable and the final variable, it shows that there are differences in the treatment given to each variable, namely before and after the implementation of the blended learning model with video conference media. With the normality gain test, it was concluded that the application of the blended learning learning model with video conference media has a level of effectiveness dominated by moderate criteria of 95%.

Based on the results of the study for the variables of students' mathematical communication ability, results were obtained $T_{equation}$ = 12,972 with free degrees (df) = $20 - 1 = 19$ and T_{table} at a confidence level of 95% or a significance of 5% was 2.100922. Thus $T_{Equation} > T_{table}$ = 12,972 > 2,100922 then H_0 rejected or Ha accepted. So, it can be concluded that there is a significant influence on the application of the Blended Learning Learning Model with Video Conferences Media on improving students' mathematical communication skills at SMK Veteran Cirebon. The effect of applying the Blended Learning Learning Model with Video Conferences Media on increasing mathematical communication skills by 0.903 or 90.3%. It is based on the coefficient of determination test,

so that another factor influencing the improvement of students' mathematical communication skills is 9.7% . Based on the correlation coefficient test, it also shows that the Blended Learning Model with Video Conferences Media (X) has a significant relationship with improving students' mathematical communication skills (Y).

Data Analyze

Data Analysis of Students' Mathematical Communication Ability Test

To find out the mathematical communication skills of students in the experimental class, researchers provide tests that are of the type of pretest (initial test) and post test (final test). With one group pretest and postest, students in the experimental class were given a test of 5 points of description questions. Based on the test results, the following results are then processed and obtained:

Table 1
Paired Samples Statistics

		μ	N	σ	SE
Pair 1	Pretest Scores	36,50	20	10,465	2,340
	Posttest Scores	70,95	20	5,539	1,239

In table I the mean value for the pretest obtained a value of 36.50 and the mean value for the postest obtained a result of 70.95. From this acquisition, the difference in the mean value of 34.45 shows an increase from the pretest value to the postest value.

Through the paired sample t-test, it can also be known whether or not there are differences in the treatment given, namely before and after the application of the blended learning learning model with video conference media to students' mathematical communication skills. The following is the data on the results of the paired sample t-test:

Table 2
Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		μ	σ	SE	α = 95%				
					Lower	Upper			
Pair 1	-Pretest Scores - Posttest Scores	-34,450	9,372	2,096	-38,836	-30,064	-16,438	19	,000

Table 2 shows a sig value of 0.000 < 0.05 there is a significant difference between the initial variable and the final variable, it shows that there is a significant difference in the treatment given to each variable, namely before the application of the blended learning learning model with video conference media and after the application of the blended learning model application model with video conference media.

To determine the effectiveness of applying the blended learning learning model with video conference media, researchers analyzed with the N-Gain test, the following data on the N-Gain test results using the SPSS 20 application:

Table 3
The N-Gain test results

Criteria N- Gain	Amount of student	Percentage (%)
Height	0	0 %
Moderate	19	95 %
Low	1	5 %
Ineffective	0	0 %

In table 3, it can be concluded that the application of the blended learning model with video conference media has a level of effectiveness dominated by moderate criteria of 95%.

Analysis of the Effect of applying Blended Learning Learning Models with Video Conferences Media on Students' Mathematical Communication Skills

At this stage, the data needed to analyze the influence of blended learning learning models with video conference media on students' mathematical communication skills are the results of the distribution of questionnaires for the response of blended learning learning models with video conference media in the classroom which is used as a research experimental class and posttest results on statistical materials in the xii experimental class of SMK Veteran Cirebon for the 2021/2022 academic year even semester. The test results of the simple linear regression equation are as follows:

Table 4
Results of the simple linear regression equation

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-28,239	7,657		-3,688	,002
	Implementation of BLM with VCM	1,088	,084	,950	12,972	,000

a. Dependent Variable: Students Mathematical Communication Skills

Researchers use the Simple Linear Regression Equation Test to determine the influence of the independent variable (X) on the dependent variable (Y) and the test The coefficient of determination test used to find out how much the ability of the free variable can explain the bound variable. In this study, variable X is the application of the Blended Learning learning model with video conference media and variable Y is students' mathematical communication skills.

Based on the Table 4 above, if the blended learning model with video conferencing media is 0, then the increase in student mathematics learning outcomes is -28,239. Thus, if the blended learning model with video conferencing media is increased by 1 unit, then the increase in student mathematics learning outcomes will increase by 1,088 units. From table 4, the results of statistical testing with SPSS on variable X (Application of Blended Learning Learning Model with Media Video Conferences) obtained a calculated t value = 12.972 > 2.100922 = T table and sig = 0.000 < 0.05 then H_0 rejected. This means that the variable Application of the Blended Learning Learning Model with Video Conferences media has a significant effect on the dependent variable, namely students' mathematical communication skills

Tabel 5
Result of Determination Equation

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,950[a]	,903	,898	1,769

a. Predictors: (Constant), Application of Blended Learning Model with Video Conferences Media

From Table 5, it was obtained that the magnitude of the influence of the application of blended learning models with video conference media on students' mathematical communication skills in the R Square column was 0.903 or 90.3%. Meanwhile, 9.7% is the magnitude of the influence of other factors on students' mathematical communication skills.

Data Analysis of Response Questionnaires for the Application of Blended Learning Learning Models with Video Conferences Media

Tabel 6
Results of the recapitulation of the response questionnaire for the application of the blended learning model withmedia video conferences.

No	indicators	Percentage	Criterion
1	Learning preparation	86,6 %	Good
2	Student interest in mathematics learning	69,4 %	Good enough
3	The suitability of learning models with mathematics learning	68 %	Good enough
4	Student motivation in mathematics learning	66,5 %	Good enough
5	Students have an interest in video conferences	78,6 %	Good
6	Student evaluation after the application of blended learning learning models with video conference media	76,8 %	Good
	Cumulative Average	74,3%	Good enough

Based on Table 6 above, it can be seen that the cumulative presentation of student response questionnaires to the application of the Blended Learning Model application model with Video Conferences media in mathematics learning from each indicator is 74.3% of the category is quite good. The results of the experimental class response applying the Blended Learning Learning Model with Video Conferences media with the number of students 20 students and 25 response questionnaire statements collected in 6 indicators can be seen, the least student response is 66.5%, namely in the fourth indicator, namely the indicator of student motivation in mathematics learning while the highest student response is 86.60% in the first indicator, namely learning preparation.

To determine students' responses to the application of blended learning models with video conference media in the mathematics learning process, researchers used a Likert scale questionnaire as a data collection instrument. The questionnaire contained 25 statements consisting of six indicators, namely indicators of learning preparation, student interest in mathematics learning, the suitability of learning models with mathematics learning, student motivation in mathematics learning, students have an interest in video conferences, student evaluation after the application of blended learning learning models with video conference media. This questionnaire has been validated previously by validators and has been distributed to 20 experimental class students, namely grade 12 AKL The following are the results of the recapitulation of the response questionnaire for the application of the blended learning model withmedia video conferences.

Discussion

The similarity of research by the author with relevant research is to examine the influence of the application of blended learning learning models on students' mathematical communication skills. The difference between the research by the authors and other relevant studies is the use of the media and platforms used. The author wants to examine whether there is an influence of the application of the Blended learning model with Video conferences media on students' mathematical communication skills, while the platform used in this study is the Google meet application.

Communication is an essential part of learning mathematics. The role of communication in learning mathematics is mathematical communication can be exploited in various perspectives, helping sharpen students' ways of thinking and sharpen students' ability to see multiple mathematical bonding materials (Faridh F et al., 2019; Shodiqin et al., 2020). Communication is a tool for measuring the growth of students' understanding and comprehension of mathematics. Through communication, students can organize and consolidate their mathematical thinking. Communication between students in learning mathematics is essential for building mathematical knowledge, developing problem-solving and improving reasoning, growing self-confidence, and improving social skills. "Writing and talking" can be a potent tool to form an inclusive mathematics community.

The findings show that respondents understand the importance of technical equipment and support, but they need training with practical guidelines. This need means that teachers understand the significance of their role in the model's success and that training will give them the confidence to incorporate the virtual classroom (video conference) into their teaching practice. Previous research has identified teacher expertise as essential in successfully implementing blended learning programs (Diep et al., 2017). Their knowledge of and experience with specific technologies and web applications in an educational setting strongly predict their attitude toward online learning (Peytcheva-Forsyth et al., 2018). The teacher is responsible for developing students' digital competencies, which means that their professional and personal digital competencies are critical (Haqq, Hidayah, et al., 2022). However, it is unclear whether teacher competence in using ICT is age-related; the problem faced by many mathematics teachers was the lack of innovation in utilizing information technology in the learning process. (Sumliyah & Handoko, 2020). Younger teachers may be more competent simply because they are part of the digital generation, but older teachers may be far more successful in integrating technologies due to their pedagogical experience. The teacher's expertise mediates student perceptions of the quality of the virtual environment; additionally, blended learning modalities imply that the teacher decides how ICT should work.

Overall, using the Blended Learning Learning Model with Media Video Conferences significantly impacts students' mathematical communication skills at SMK Veteran Cirebon. Using the Blended Learning Learning Model in conjunction with Media Video Conferences improves mathematical communication skills by 0.903, or 90.3%. Based on the coefficient of determination test, another factor influencing the improvement of students' mathematical communication skills is 9.7%. According to the correlation coefficient test, the Blended Learning Learning Model with Media Video Conferences (X) significantly improves students' mathematical communication skills (Y).

CONCLUSION AND IMPLICATION

Conclusion

Students' mathematical communication skills have improved after the application of the blended learning learning model with video conference media, this can be seen from the pretest obtained a score of 36.50 and the mean value for postest obtained a result of 70.95.From this acquisition, the difference in the mean value of 34.45 shows an increase from the pretest value to the postest value. Obtained statistical testing results with SPSS on variable X (Application of Blended Learning Learning Model with Video Conferences Media) obtained a calculated t value = 12.972 > t table . This means that the variable Application of the Blended Learning Learning Model with Video Conferences media has a significant effect on the dependent variable, namely students' mathematical communication skills. Through the determination test, the effect of applying blended learning models with video conference media on students' mathematical communication skills in the R Square column was 0.903 or 90.3%.Meanwhile, 9.7% is the magnitude of the influence of other factors on students' mathematical communication skills. The cumulative presentation of the questionnaire of student responses to the application of the Blended Learning Model application model with Video Conferences media in mathematics learning from each indicator was 74.3% of the category is quite good.

Implication

Based on the conclusions of the research, the achievement and improvement of mathematical communication skills of students who get Blended Learning learning with Video Conferences media is better than before the implementation of the Blended Learning learning model with Video Conferences media. This conclusion has implications that the Blended Learning learning model with Video Conferences media can be used as a learning model that can improve learning outcomes, especially students' mathematical communication skills in mathematics learning.

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