The Use of Audio-Visual Assisted Google Classroom for Mathematics Course in Stmik Stikom Indonesia

I M Dedy Setiawan
Technical Information, STMIK STIKOM, Indonesia
Email: dedy09347@gmail.com

I D G Ari Oka
Technical Information, STMIK STIKOM, Indonesia.
Email: dewaoka02@gmail.com

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A B S T R A K

Pemanfaatan teknologi dalam bentuk media pembelajaran matematika belum diterapkan secara maksimal ditengah derasnya kemajuan teknologi saat ini, ditambah dengan adanya perubahan pola pembelajaran dari tatap muka di kelas menjadi pola pembelajaran daring akibat himbauan bekerja dari rumah. Hal ini tentu saja akan berdampak terhadap hasil belajar peserta didik. Melihat kondisi seperti ini, diperlukan inovasi dalam pembelajaran matematika yaitu dengan memanfaatkan penggunaan media dalam pembelajaran, salah satunya adalah penggunaan media audio visual berbantuan *google classroom*. Tujuan dilakukannya penelitian ini adalah mengetahui adanya pengaruh penggunaan media audio visual berbantuan *google classroom* pada mata kuliah matematika di STMIK STIKOM Indonesia. Metode penelitian yang digunakan adalah *quasi eksperimen* dengan *non equivalent control group design*. Instrumen yang digunakan dalam penelitian ini adalah tes hasil belajar matematika. Teknik Analisis data dalam penelitian ini meliputi analisis deskriptif. Hasil penelitian menunjukkan bahwa terdapat pengaruh penggunaan media audio visual terhadap hasil belajar matematika dengan rata-rata skor hasil belajar matematika sebesar 76,00 yang dinyatakan signifikan, sehingga pembelajaran dengan memanfaatkan media audio visual memberikan pengaruh terhadap hasil belajar matematika.

A B S T R A C T

The use of technology in the form of mathematics learning media has not been maximally applied amidst the rapid advances in technology today, coupled with a change in learning patterns from face-to-face in class to online learning patterns due to calls to work from home. This of course will have an impact on the learning outcomes of students. Seeing these conditions, innovation is needed in mathematics learning, namely by utilizing the use of media in learning, one of which is the use of audio-visual media assisted by google classroom. The purpose of this research is to determine the effect of using audio-visual media assisted by google classroom on mathematics courses at STMIK STIKOM Indonesia. The research method used was a quasi-experimental with a non-equivalent control group design. The instrument used in this study was a mathematics learning outcome test. The data analysis technique in this research includes descriptive analysis. The results showed that there was an effect of the use of audio-visual media on mathematics learning outcomes with an average score of 76.00 mathematics learning outcomes which was declared significant so that learning using audio-visual media had an effect on mathematics learning outcomes.

Introduction

Entering the era of the industrial revolution 4.0, there have been many changes in all aspects of our lives related to the use of technology. Starting from the fields of economy, social life, health, and even education. In the field of education, the internet has become a very important role. Especially with the COVID-19 pandemic outbreak which requires everyone, especially education stakeholders to work from home (work from home), the internet is a solution to bridging communication between lecturers and students, both in delivering lecture material and assessing learning outcomes. This phenomenon of course causes a change in learning patterns that were originally direct, namely through face-to-face classes into an online learning process (online). (Maharani & Kartini, 2019; Nirfayanti & Nurbaeti, 2019) stated that with this growing technological era, the learning program was directed to be able to make better use of technology. This means that the role of technology should be maximally applied in supporting the learning process. So that technology can be applied optimally, it is necessary to have an innovation that is applied in online learning activities so that what we call e-learning can run according to its purpose. One effort that can be done is to apply online learning media as a substitute for face-to-face activities in class. The utilization of learning media properly and maximally will provide maximum results for one's learning outcomes (Ernawati, 2014; Marhayanti, 2018). Mathematics as one of the compulsory subjects in the STMIK STIKOM Indonesia informatics engineering study program is certainly a relevant object if the learning process is assisted by using learning media. This is quite reasonable because concepts in mathematics that are abstract in nature can be visualized into more contextual and

realistic concepts for students. This is in accordance with the opinion (Hikmah, 2017; Nosa, 2018) which states that learning materials that are abstract in nature cause students' understanding of the material to be less clear so that it is necessary to visualize abstract material to be more concrete.

In fact, in the field, the mathematics learning process is still oriented to conventional methods in the form of lectures and assignments so that there seems to be a lack of innovation in learning. The use of technology in the form of mathematics learning media has also not been maximally applied amid the rapid advancement of technology today, coupled with changes in learning patterns from face-to-face in class to online learning patterns. This of course has an impact on student learning outcomes which are still low. Online learning certainly requires the ability to manage the class well, so it is necessary to also take advantage of applications that can help manage the class. Google Classroom is an application that can be used in the mathematics learning process through audio-visual learning media. both from the planning stage, the implementation of learning, and the assessment of learning outcomes can be done through Google Classroom so that even though the learning process is carried out online, class management and the learning activity process are still running effectively (Maharani & Kartini, 2019; Sari et al., 2019) stated that Google Classroom can make it easier for teachers to create and share learning materials, collect assignments, and provide grades and feedback on student assignments. One of the learning media that can be pursued based on the conditions described above is by implementing online audio-visual learning media. Audiovisual learning media is expected to be able to help the online mathematics learning process in a more innovative and fun way so that it is expected to have a positive effect on students' mathematics learning outcomes. Audio-visual media is not an image or concept map per se, but in audio-visual media, it combines sound and image that is interesting and fun (Kusuma, 2018; Wahyudi et al., 2003).

Learning media is basically a tool that can be used by teachers to facilitate the delivery of teaching materials/lectures so that learning objectives can be achieved more quickly. The accuracy in choosing learning media is also important and needs to be considered. This is because not all subject matter/courses can be delivered with only 1 or 2 learning media. The accuracy in choosing learning media is also adjusted to the methods, approaches, and learning models used (Fadillah & Bilda, 2019). For example, in mathematics 2 with material Boolean algebra and Graph Theory, relevant learning media can be selected. Abstract material can be visualized more concretely through the implementation of learning media. (Kania & Arifin, 2020; Nomleni & Manu, 2018) states that with learning media students can immediately see simulations and demonstrations that resemble actual events so that students can grasp concepts properly and correctly and can be applied in everyday life. Besides the dominant factor of abstract lecture material, learning in a pandemic era like now which conditions students to learn from home online, the use of audiovisual media is very appropriate to be implemented. With the presence of audio-visual media, mathematics course material whose concepts tend to be abstract can be packaged in the form of videos for students to listen to and understand. Repetition of material can be done at any time when students feel the material is being missed or there are some concepts that are still not understood by playing back the video, this is one of the advantages of audiovisual media. Audiovisual media has a positive effect on students' critical thinking skills (Anggraeni et al., 2019). This of course gives our consideration as teaching staff to further explore the use of audio-visual media, especially in online learning activities. By paying attention to the results of the background explanation above, it is deemed necessary to conduct a study on the use of audio-visual learning media in mathematics courses at STMIK STIKOM Indonesia. The purpose of this study was to determine the effect of using audio-visual learning media assisted by google classroom on mathematics courses at STMIK STIKOM Indonesia. This certainly supports novelty's research from this research that there has been no research in online learning situations using audiovisual media assisted by the google classroom application.

Method

The population in this study were STIKI students in the even semester of the 2019/2020 academic year. Two classes of samples would be taken in the Informatics Engineering Study Program. Sampling was done using a purposive random sampling method.

The research was conducted at STIKI in the informatics engineering study program even semester 2019/2020 which was designed for 10 meetings from April to May 2020.

This research is a quasi-experiment with a non-equivalent control group design because it does not change the existing class. The variables in this study were the scientific approach based on project assessment as the independent variable and mathematics learning outcomes as the dependent variable. An overview of the research design used is as follows:

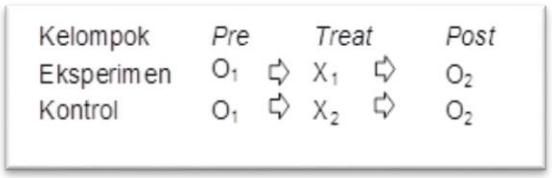

Figure 1. Research Design

Information:
O_1: test results of the study before treatment
O_2: test results of learning after treatment
X_1: The scientific approach is based on project assessment
X_2: the conventional approach

The research stage was divided into the preparation stage, implementation stage, and the final stage, each of which is described as follows. a) Preparation Stage, the steps were taken in the preparation stage, among others: (1) Conducting pre-research to obtain information about the research to be carried out; (2) Analysis of learning tools in the form of RPS; (3) Making research instruments in the form of learning outcomes tests; (4) perform instrument validation; (5) To revise the instruments that are carried out; (6) Doing test questions; (7) Analyzing data from the trial results, b) Implementation Stage, the implementation of the research includes: (1) Determining the research schedule; (2) Providing pretest questions before doing the treatment; (3) Conduct online learning using audio-visual media assisted by google classroom in the experimental class; (4) Conducting online learning using the assignment method in the control class; (5) Providing post-test questions after being given treatment; (6) Providing a test of learning outcomes after being given the treatment, c) The final stage, the final stage of this research are: (1) Managing the data that has been obtained from the pretest and post-test results and distributing questionnaires with statistical tests; (2) Describe the results of data analysis and provide conclusions in response to the problem formulation; (3) Prepare research reports. The data collection technique used the instrument used in this study was a mathematics learning outcome test. Before the data is collected, the instrument is first examined by expert judges, then empirical testing is carried out to test the validity and reliability of the instrument items of each variable. The data analysis technique in this study includes descriptive analysis, prerequisite analysis, and hypothesis testing. Descriptive analysis was conducted to determine the size of the concentration and distribution of data. The prerequisite analysis test consisted of the normality test using the Kolmogorov-Smirnov test and the homogeneity test using the Levene test. Hypothesis testing using one way ANOVA test. If the test results show a significant number, then proceed with further testing of Least Significance Difference (LSD).

Result and Discussion

The object in this study was the difference in mathematics learning outcomes of STMIK STIKOM Indonesia students as a result of online learning assisted by google classroom using audio-visual learning media. Therefore, the research variables were divided into independent variables, namely learning using audio-visual media assisted by google classroom and the dependent variable on mathematics learning outcomes. There were four groups of data in this study, namely the experimental group and the control group, each of which was divided into two groups, namely the group before and after being given treatment. After the treatment, the research results were obtained which included descriptive research data, prerequisite analysis data, and hypothesis test data. The following is a descriptive analysis of the mathematics learning outcomes of the experimental class and the control class before and after being given treatment.

Table 1. Data Description of Mathematics Learning Outcomes

		eks_pra	eks_post	kon_pra	kon_post
N	*Valid*	30	30	30	30
	Missing	90	90	90	90
Mean		68	76	68.5	69.33
Median		70	75	70	70
Mode		75	80	60	80
Std. Deviation		8.96	6.87	10.35	8.78
Variance		80.34	47.241	107.155	77.126
Sum		2040	2280	2055	2080

a. Multiple modes exist. The smallest value is shown

Mathematics learning outcomes data that follow learning using audio-visual media assisted by google classroom before being given treatment (pretest) have a theoretical score range of 0-100; n = 30; maximum score = 85; minimum score of 50; range = 35; many interval classes = 6; interval class length = 6; average = 68; standard deviation (SD) = 8.96; mode = 75; and median = 70. The data frequency distribution is as in Table 2 below.

Table 2. Frequency Distribution of Experimental Classes (Pretest)

No.	Class Interval	Median	Absolute Frequency	Relative Frequency (%)
1	50 – 55	52,5	3	10
2	56 – 61	58,5	6	20
3	62 – 67	64,5	5	16,67
4	68 – 73	70,5	5	16,67
5	74 – 79	76,5	7	23,33
6	80 – 85	82,5	4	13,33
Total			**30**	**100**

Table 2 shows that as many as 16.67% of students obtained scores of mathematics learning outcomes around the average, 36.66% of students obtained scores above the average, and 46.67% of students obtained scores below the average. Mathematics learning outcomes data that follow learning using audio-visual media assisted by google classroom after being given treatment (posttest) have a theoretical score range of 0 - 100; n = 30; maximum score = 90; minimum score of 60; range = 30; many interval classes = 6; interval class length = 6; average = 76; standard deviation (SD) = 6.87; mode = 80; and median = 75. The data frequency distribution is as in Table 3 below.

Table 3. Frequency Distribution of Experiment Class (*Posttest*)

No.	Class Interval	Median	Absolute Frequency	Relative Frequency (%)
1	60 – 65	62,5	2	6,67
2	66 – 71	68,5	8	26,67
3	72 – 77	74,5	7	23,33
4	78 – 83	80,5	9	30
5	84 – 89	86,5	2	6,67
6	90 – 95	92,5	2	6,67
Total			**30**	**100**

Table 3 shows that as many as 23.33% of students obtained scores of mathematics learning outcomes around the average, 43.34% of students obtained scores above the average, and 33.34% of students obtained scores below the average. Mathematics learning outcomes data that follow online learning without using audio-visual media before being given treatment (pretest) have a theoretical score range of 0-100; n = 30; maximum score = 90; minimum score of 50; range = 40; many interval classes = 7; interval class length = 6; average = 68.5; standard deviation (SD) = 10.35; mode = 60; and median = 70. The data frequency distribution is as in Table 4 below.

Table 4. Frequency Distribution of Control Class (Pretest)

No.	Class Interval	Median	Absolute Frequency	Relative Frequency (%)
1	50 – 55	52,5	5	16,67
2	56 – 61	58,5	5	16,67
3	62 – 67	64,5	4	13,33
4	68 – 73	70,5	5	16,67
5	74 – 79	76,5	5	16,67
6	80 – 85	82,5	5	16,67
7	86 – 91	88,5	1	6,67
Total			**30**	**100**

Table 4 shows that as many as 16.67% of students obtained scores of mathematics learning outcomes around the average, 40.01% of students obtained scores above the average, and 46.67% of students obtained scores below the average. Mathematics learning outcomes data that follow online learning without using audio-visual media after being given treatment (posttest) have a theoretical score range of 0-100; n = 30; maximum score = 80; minimum score of 50; range = 30; many interval classes = 6; interval class length = 6; average = 69.3; standard deviation (SD) = 8.69; mode = 70; and median = 70. The data frequency distribution is as in Table 5 below.

Table 5. Frequency Distribution of Control Class (Posttest)

No.	Class Interval	Median	Absolute Frequency	Relative Frequency (%)
1	50 – 55	52,5	2	6,67
2	56 – 61	58,5	8	26,67
3	62 – 67	64,5	2	6,67
4	68 – 73	70,5	6	20
5	74 – 79	76,5	6	20
6	80 – 85	82,5	6	20
Jumlah			**30**	**100**

Table 5 shows that as many as 20% of students obtained scores of mathematics learning outcomes around the average, 40% of students obtained scores above the average, and 40% of students obtained scores below the average. The Prerequisite Test results of the four data groups include the normality test of the data distribution and the homogeneity test of variance. The normality test used the Kolmogorov-Smirnov test, while the variance homogeneity test used the Levene test with a significance level of 5%. The prerequisite test results according to Table 6 and Table 7 are presented below.

Table 6. Variant Homogeneity Test Results

Test of Homogeneity of Variances

Result of pre-test

Levene Statistic	*df1*	*df2*	*Sig.*
.723	1	58	.399

Table 7. Data Normality Test Results

Tests of Normality

	Kolmogorov-Smirnov[a]			*Shapiro-Wilk*		
	Statistic	*df*	*Sig.*	*Statistic*	*df*	*Sig.*
eks_pra	*.149*	*30*	*.086*	*.956*	*30*	*.239*
eks_pos	*.153*	*30*	*.071*	*.942*	*30*	*.105*
kon_pr	*.128*	*30*	*.200[*]*	*.965*	*30*	*.403*

kon_po	*.141*	*30*	*.134*	*.912*	*30*	*.016*

a. Lilliefors Significance Correction

**. This is a lower bound of the true significance.*

Based on Table 6, it is obtained a significance value of 0.399> 0.05 so that H0 is accepted and H1 is rejected, which means that the data distribution is homogeneous. Based on Table 7, the significance value for all groups is more than 5% so that H0 is accepted and H1 is rejected, which means the data is normally distributed. Hypothesis testing using One-Way ANOVA with a significance level of 5%. The following are the results of the hypothesis test.

Table 8. Hypothesis Test Results

	Sum of Squares	**Df**	***Mean Square***	**F**	**Sig.**
Between Groups	1255.625	3	418.542	5.368	.002
Within Groups	9044.167	116	77.967		
Total	10299.792	119			

Based on Table 8, it is obtained that the value of F = 5.368 and the significance of 0.002 <5% so that H0 is rejected and H1 is accepted, which means that the difference between groups is significant. Followed by a further test using the LSD test as follows.

Table 9. LSD Advanced Test

(I) group	**(J) Group**	***Mean Difference* (I-J)**	***Std. Error***	**Sig.**	***95% Confidence Interval***	
					Lower Bound	***Upper Bound***
1	2	-8.0000*	2.27987	.001	-12.5156	-3.4844
	3	-.5000	2.27987	.827	-5.0156	4.0156
	4	-1.3333	2.27987	.560	-5.8489	3.1822
2	1	8.0000*	2.27987	.001	3.4844	12.5156
	3	7.5000*	2.27987	.001	2.9844	12.0156
	4	6.6667*	2.27987	.004	2.1511	11.1822
3	1	.5000	2.27987	.827	-4.0156	5.0156
	2	-7.5000*	2.27987	.001	-12.0156	-2.9844
	4	-.8333	2.27987	.715	-5.3489	3.6822
4	1	1.3333	2.27987	.560	-3.1822	5.8489
	2	-6.6667*	2.27987	.004	-11.1822	-2.1511
	3	.8333	2.27987	.715	-3.6822	5.3489

Based on observed means.

The error term is Mean Square(Error) = 77.967.

**. The mean difference is significant at the 0.05 level.*

Based on Table 9, it can be explained that the learning outcomes of the experimental group after receiving treatment (group 2 in the table) have a significant difference in the average mathematics learning outcomes compared to other groups with a significance value of less than 5% each. These results indicate that statistically there is a difference in the average mathematics learning outcomes between the group that took online learning (google classroom) using audio-visual media and the group that did not use audio-visual media. Quantitatively, this difference is shown in table 9, namely between group 2 and group 4 with a significance of 0.04 (more than t table 5%), so it can be concluded that the use of audio-visual media assisted by google classroom has an effect on student mathematics learning outcomes at STMIK. STIKOM Indonesia. At the end of the learning activity, after giving a learning outcome test, the researcher gave a questionnaire via google form to see the extent of student responses to the online learning process that has been carried out through the google classroom application. The results of the questionnaire showed

that of the 58 respondents, 42 (72.4%) chose Google Classroom as an online learning medium during the pandemic and 36 people (62.1%) chose audio-visual media as a learning medium in mathematics lectures. The following is a diagram of the results of the questionnaire from the 58 respondents.

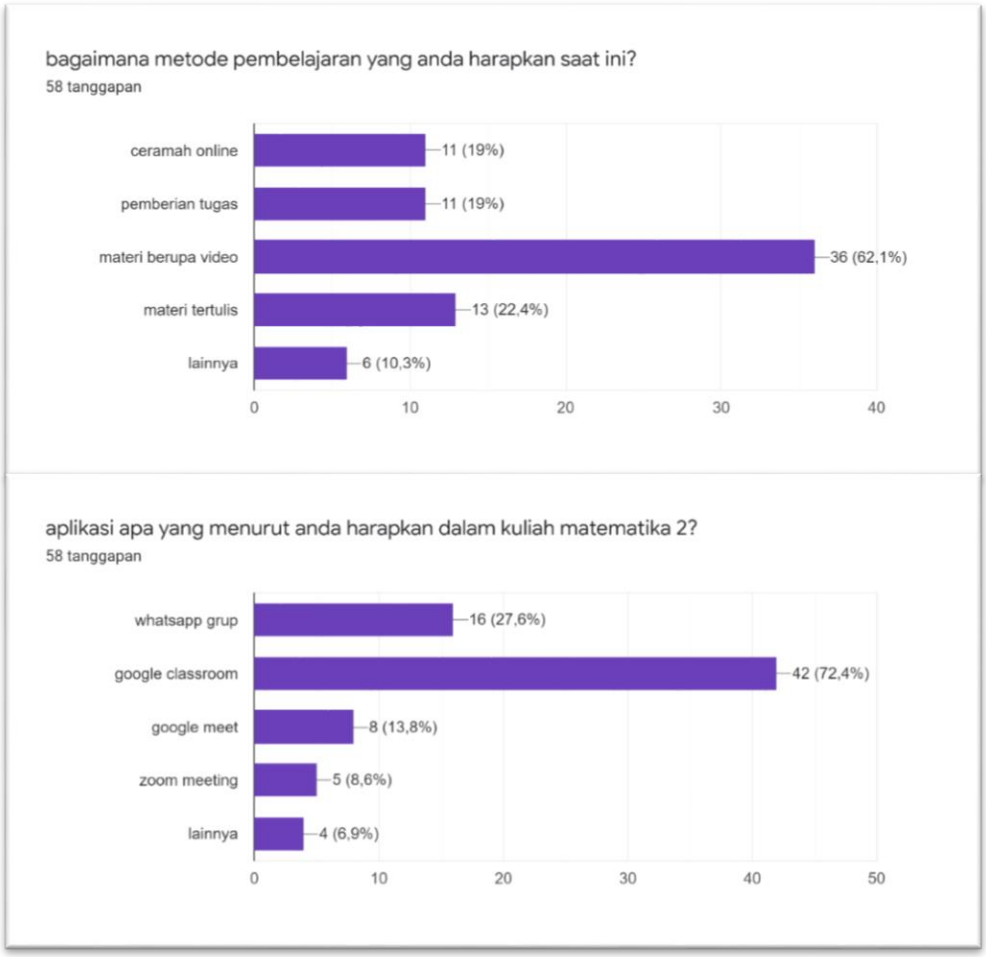

Figure 2. Diagram of Student Questionnaire Result

Based on the research results that have been described above, both quantitatively and qualitatively, it can be seen that the hypothesis testing in this study compares the two groups of homogeneous sample data based on the results of the pretest and each of them is given a mathematics learning outcome test (posttest). The two groups of data are groups of students who take lessons using audio-visual media and groups of students who take lessons without using audio-visual media, but learning only in the form of online lectures and assignments. Each of these two groups facilitated their learning using the google classroom application. The instrument used to measure mathematics learning outcomes has been validated by an expert (expert judgment) before being implemented. The results of this test indicate that the mathematics learning outcomes of the sample group using audio-visual media have a higher average of 76.00 compared to the control group of 69.33 where this difference is statistically significant (indicated by the calculated F value of 5.368 and a significance of 0.004 <5% in the LSD follow-up test), so learning using audio-visual media has an effect on mathematics learning outcomes. Learning media is basically a tool that can be used by teachers to facilitate the delivery of teaching materials/lectures so that learning objectives can be achieved more quickly. The accuracy in choosing learning media is also important and needs to be considered. This is because not all subject matter/courses can be delivered with only 1 or 2 learning media. The accuracy in choosing learning media is also adjusted to the methods, approaches, and learning models used (Fadillah & Bilda, 2019; Febryanto, 2015). For example, in mathematics courses with material Boolean algebra and Graph Theory, relevant learning media can be selected. Abstract material can be visualized more concretely through the implementation of learning media. (Kania & Arifin, 2020; Yusantika et al., 2018) states that with learning media students can immediately see simulations and demonstrations that resemble actual events so that students can grasp concepts properly and correctly and can be

applied in everyday life. In addition to the dominant learning material factors that are abstract, learning in the pandemic era like now which conditions students to learn from home online, the use of audiovisual media is very appropriate to be implemented. With the presence of audio-visual media, mathematics course material whose concepts tend to be abstract can be packaged in the form of videos for students to listen to and understand. Repetition of material can be done at any time when students feel that the material is being missed or there are some concepts that are still not understood by playing back the video, this is one of the advantages of audio-visual media. Audiovisual media has a positive effect on students' critical thinking skills (Anggraeni et al., 2019; Yuanta, 2017). This of course gives our consideration as teaching staff to further explore the use of audio-visual media, especially in online learning activities. There are several audio-visual video links or links through the YouTube channel that the researchers designed with the team to package material in mathematics 2, including bit.ly/teorigraf_bagian1, which discusses the meaning of graphs, graph history, types of graphs, and their applications. Through audio-visual learning assisted by google classroom, students will be more motivated to learn, because learning mathematics becomes more relaxed and interesting. This can be seen from the enthusiasm of most students who ask questions and discuss through the WhatsApp application related to the learning videos uploaded on Google classroom. Teachers also find it easier to determine and manage the timing of lectures with the google classroom, as well as make assessments at the end of the lesson. No different from the learning process in class in general, the online learning process by utilizing audio-visual media assisted by google classroom also makes the learning atmosphere more effective and efficient. This application cultivates active students more than tutors who only share material and assignments without voice explanations. Meanwhile, most students will understand the material through direct explanation via voice (Ansong-Gyimah, 2020).

Learning using audio-visual learning media provides new experiences for students in mathematics subjects because using audio-visual learning media can increase motivation, interest in learning, and student attention, causing pleasure, interest, and not being bored in the learning process of mathematics subjects. The interest and attention of these students have a huge effect on learning outcomes (Ayu et al., 2019; Pranowo & Prihastanti, 2020). There are several studies related to the use of audiovisual media in mathematics learning, including research by (Sarwinda et al., 2020) The results showed that audio-visual media integrated with relevant learning approaches were able to increase students' learning motivation and critical thinking skills. Apart from that research by (Nurcahyono & Novarina, 2016) states that the use of audio-visual media is feasible to be implemented in mathematics learning. (Diana & Maharani, 2019) in his research on the development of audio-visual learning media with tutorial techniques based on conceptual abilities in integral subjects. The results of this study indicate that learning using audio-visual media has a positive effect on motivation and learning outcomes. Observing the results of research and relevant research studies, of course, further strengthens the results of this study that the use of audio-visual media assisted by google classroom has an effect on mathematics learning outcomes, so it is natural that the average mathematics learning outcomes of the groups participating in learning using audio-visual media is higher than the group that uses audiovisual media. participate in learning without using audio-visual media even though the learning is both done online with the help of the google classroom application. This certainly supports novelty's research from this research that there has been no research in online learning situations using audiovisual media assisted by the google classroom application.

Conclusion and Suggestions

Based on the results of research and discussion, it can be concluded that there is a significant difference in mathematics learning outcomes of STMIK STIKOM Indonesia students between groups that take online learning through google classroom by utilizing audio-visual media and groups that take online learning through google classroom without utilizing audio-visual media. Mathematics learning outcomes that follow learning through audio-visual media have an average score after treatment of 76.00 higher than mathematics learning outcomes that follow learning without using audio-visual media with an average score after treatment of 69.33. In other words, the use of audio-visual media assisted by google classroom has an effect on the mathematics learning outcomes of STMIK STIKOM Indonesia students.

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