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The Effect Of The Use Of Learning Videos On Mathematical Communication Ability In Terms Of Students' Initial Ability

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Abstract – Students' ability to read graphs and visualize numbers on tables into graphs, understand story questions, and re-communicate the material provided by the teacher is not optimal. These problems are covered in the realm of mathematical communication which requires audio and visual media to make it easier for students to achieve learning goals. This study aims to determine the influence of the use of learning videos on mathematical communication ability in terms of students' initial ability. The method used in this study is a quantitative approach with a factorial design of 2 x 2. The study samples were class X MIA 4 and X MIA 7 MAN 1 Mandailing Natal. Data were analyzed using a two-way ANAVA test with the free variable being the learning video, the bound variable being mathematical communication ability, and the moderator variable being the student's initial ability. Based on the results of the data analysis that has been carried out, several conclusions were obtained, namely (1) there is no difference in students' mathematical communication ability in the experimental class and control class, (2) there are differences in mathematical communication ability based on students' initial ability, and (3) there is no interaction between the class and the initial ability to students' mathematical communication ability. In addition, the results of the questionnaire analysis showed that the use of learning videos was in the category of quite good.

Keywords – learning videos; mathematical communication ability; initial ability

I. INTRODUCTION

The outbreak of the Covid-19 virus does not only have an effect on health, social, and economic aspects. But it also has repercussions for the world of education. This is based on Circular Letter (SE) Number 4 of 2020 concerning the Implementation of Education Policies in the Emergency Period of the Spread of Covid-19 which requires learning to be carried out online. The online learning process requires various means to assist students in understanding the material, learning to communicate ideas, and improve their mathematical abilities. Mathematical communication ability are one of the basic abilities that students must master in order to create a good understanding [1].

Mathematical communication ability is the ability to organize arithmetic thinking, communicate logical and clear ideas to others, analyze and evaluate previously used strategies, as well as use ideal language to express very appropriate ideologies [2]. Mathematical communication has an important role in learning mathematics because students can express, explain, describe, and listen to a mathematical understanding [3]. Communication ability are necessary to understand mathematical ideas precisely. Weak communication skills will weaken other mathematical abilities. Students who have high mathematical communication skills can make diverse representations and find it easier to find problem-solving alternatives [4]. Mathematical communication includes written text, images, and mathematical expressions. A written text is the act of providing answers through the use of developed language, modeling situations, explaining and making questions, listening, discussing, writing, structuring arguments, and generalizations. Drawing involves the reflection of real objects, drawings, and diagrams into mathematical ideas and vice versa. While mathematical expression is a descriptive concept that involves everyday events in language or mathematical symbols

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[5].

Indicators of mathematical communication ability according to NCTM [6], namely (1) Ability to express mathematical ideas through oral, written, and demonstrate them, and describe them visually, (2) Ability to understand, interpret, and evaluate mathematical ideas both orally, in writing, and in other visual forms, and (3) Ability to use terms, mathematical notation and their structures to present ideas, describe relationships with model of the situation. Sumarmo [7] put forward indicators of mathematical communication ability, including (1) Linking real objects, drawings, and diagrams into mathematical ideas, (2) Explaining ideas, situations and mathematical relationships orally or in writing with real objects, images, graphs, and algebra, (3) Declaring everyday events in language or mathematical symbols, (4) Listening, discussing, and writing about mathematics, (5) Reading with the comprehension of a written mathematical presentation, (6) Make conjectures, construct arguments, formulate definitions, and generalizations, and (7) Explain and make statements about the mathematics that has been studied.

The indicators of mathematical communication ability used in this study are (1) Students' ability to read and interpret data in the form of graphs into mathematical models, (2) Students' ability to present mathematical statements into table form, (3) Ability to visualize problems into diagrams, and (4) Ability to determine concepts of a problem and use them in everyday life. However, in reality students' mathematical communication skills still need to be improved [8]. The low mathematical communication skills can also be seen from Palinussa's research [9] which says that students have difficulty when stating problems with problems into mathematical notation and symbols. Halawa [10] and Hidayat [11] said that students have not been able to express mathematical ideas into writing in the form of graphs, algebras, or images. Based on the observation results, information was obtained that students rely more on answers shared by their classmates. It means that students are less persistent in finding solutions to math problems. When the student is asked to re-present the material he understood through the shared module, the student simply re-reads the contents of the module. This shows that students' ability is still low in communicating back to the material that has been given by the teacher. In addition, students' ability to read graphs and visualize numbers on tables into graphs is not optimal.

Learning videos can be used as an effective learning tool for students [12]. Through learning videos, students can hone their visualization and listening skills [13]. Learning videos are media that present audio and visual containing learning messages, both concepts, principles, procedures, theories, applications of knowledge to help understand a learning material [14]. According to Prayatna [15] learning videos are systematically designed by referring to the applicable curriculum and applying learning principles so as to make it easier for students to understand the subject matter. The learning video in this study is in the form of a video explaining the material by the teacher. This video conveys a message to students in the form of audio and visual in which there are interactive learning materials so that students can learn independently which is not limited by place and time. Before being shared with students, the video is first edited with the Kinemaster application to add backsound and animation.

The criteria for learning videos in this study are (1) the accuracy of the media with the content of the subject matter, (2) the video media can be accessed easily without being limited by time, (3) the video media provided is clear and interesting, and (4) the video media provided has a suitability for learning objectives. Hadi [16] explained that learning videos are needed once in learning because they are communicative, repeatable, slowed down, and enlarged. Like previous research that states that the use of video in learning can increase interest and learning outcomes [17], [18], as well as students' mathematical ability [19].

II. Research Methods

This research uses a quantitative approach of quasi-experimental type. According to Sugiyono [20] quantitative research is research that requires data in the form of numbers. The design of this study used a 2x2 factorial research design. The basis for selecting students with high or low abilities is seen in the daily life of students in participating in learning and giving quick answer questions given by teachers during learning activities. The population in this study was all students of class X MAN 1 Mandailing Natal for the 2020/2021 academic year. The study sample was class X MIA 4 and X MIA 7 MAN 1 Mandailing Natal students totaling 74 students. Qualitative data obtained from the results of questionnaires using learning videos. Meanwhile, quantitative data are obtained from mathematical communication ability tests. Data were analyzed using a two-way ANAVA test.

III. Results And Discussion

This study aims to determine the influence of the use of learning videos on mathematical communication ability in terms of students' initial abilities. This research involved two classes, namely class X MIA 4 as an experimental class and X MIA 7 as a

control class. Based on the output of SPSS, a sig value = 0.552 > 0.05 was obtained for the normality test and a sig value = 0.305 > 0.05 for the homogeneity test. This means that the mathematical communication ability test data are normally distributed and have homogeneous variance. A description of the student's mathematical communication ability test data can be seen in Table 1.

TABLE I. MATHEMATICAL COMMUNICATION ABILITY TEST DATA DESCRIPTION

Descriptive Statistics				
Dependent Variable: Kemampuan Komunikasi Matematis				
Kelas	**Kemampuan Awal**	**Mean**	**Std. Deviation**	**N**
Eksperimen	Tinggi	87,11	5,606	19
	Rendah	74,72	3,627	18
	Total	**81,08**	**7,829**	**37**
Kontrol	Tinggi	89,17	4,618	18
	Rendah	75,00	3,333	19
	Total	**81,89**	**8,195**	**37**
Total	Tinggi	88,11	5,184	37
	Rendah	74,86	3,433	37
	Total	**81,49**	**7,970**	**74**

Based on Table 1, it can be seen that the average mathematical communication ability of control class students is higher than the average mathematical communication ability of experimental class students. This proves that the use of learning videos has no effect on students' mathematical communication ability. This finding contradicts the opinion of Fatmawati [21], Pambudi [22], Fahri [23], and Pamungkas [24] that student learning outcomes become better after using learning videos. The results of this study are also not in accordance with the findings of Ruqoyyah [25] that the mathematical communication ability of students who learn with YouTube videos are better than conventional learning.

To find out the interaction between the class and the initial ability to the mathematical communication ability of students, a two-way ANAVA test was carried out. Table 2 shows the two-way ANAVA output.

TABLE II. TWO-WAY ANAVA TEST

Tests of Between-Subjects Effects					
Dependent Variable: Kemampuan Komunikasi Matematis					
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Corrected Model	3284,586[a]	3	1094,862	56,691	,000
Intercept	491149,838	1	491149,838	25431,226	,000
Kelas	25,288	1	25,288	1,309	,256
Kemampuan	3257,721	1	3257,721	168,681	,000
Kelas * Kemampuan	14,703	1	14,703	,761	,386
Error	1351,901	70	19,313		
Total	496000,000	74			
Corrected Total	4636,486	73			
a. R Squared = ,708 (Adjusted R Squared = ,696)					

Based on the output of Tests of Between-Subjects Effects obtained:

a. Sig value = 0.256 > 0.05 for class, so there is no difference in students' mathematical communication ability in experimental class and control class. This shows that the mathematical communication ability of students who learn with learning videos is the same as the mathematical communication ability of students in conventional learning.

b. Sig value = 0.000 < 0.05 for Ability, then there is a difference in mathematical communication ability based on the student's initial ability. This shows that the mathematical communication ability of high-initial ability students is better than that of low-ability students. This statement is supported by the findings of Lestari [26] and Nurussilmah [27] that there is an influence of students' initial ability on mathematics learning outcomes. In the learning process, high-initial ability students will understand the material faster than low-initial ability students.

c. Sig value = 0.386 > 0.05 for Class * Ability, then there is no interaction between the class and the initial ability to the student's mathematical communication ability. This means that the effect of learning videos on students' mathematical communication ability does not depend on the student's initial ability.

A graph of the interaction between the class and the initial ability to students' mathematical communication ability can be seen in Figure 1.

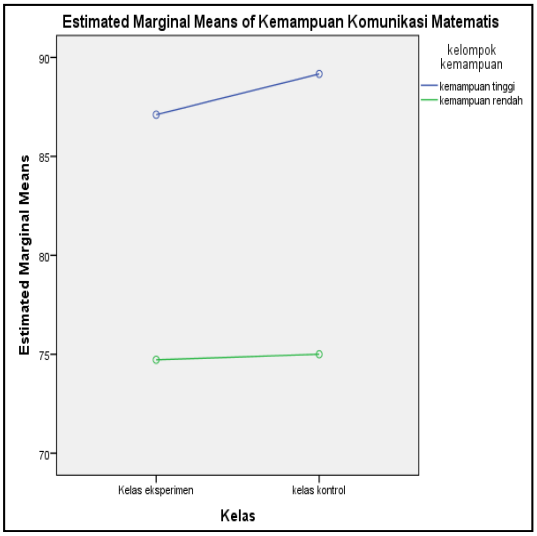

Fig. 1. Interaction between the classroom and the initial ability to students' mathematical communication ability

IV. CONCLUSIONS

Based on the results of the data analysis that has been carried out, several conclusions were obtained, namely (1) there is no difference in students' mathematical communication ability in the experimental class and control class, (2) there are differences in mathematical communication ability based on students' initial ability, and (3) there is no interaction between the class and the initial ability to students' mathematical communication ability. In addition, the results of the questionnaire analysis showed that the use of learning videos was in the category of quite good.

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