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Rectangular learning through video, is it effective during the Covid-19 pandemic?

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Abstract: The Covid-19 pandemic is a challenge for teachers and students in the learning process, especially to implement technology-based learning. Learning mathematics with the characteristics of abstract objects makes teachers have to innovate in the knowledge transfer process. However, not all teachers can make technology-based material innovations. For this reason, it is necessary to develop learning media in the form of videos on rectangular material so that they can become additional references for teachers in learning. The videos were created with the Microsoft PowerPoint application based on the ADDIE development model. The data was collected by using questionnaires, tests, and documentation. Data analysis was carried out qualitatively based on predetermined indicators. The development results show that the video is valid according to expert judgment and the results of the student response questionnaire after the implementation process. However, in terms of material, the video has not provided effectiveness in students' mathematical understanding.

Keywords: learning video; microsoft powerpoint; rectangular.

Abstrak: Pandemi Covid-19 menjadi tantangan bagi para guru dan siswa dalam proses pembelajaran, khususnya untuk menerapkan pembelajaran berbasis teknologi. Pembelajaran matematika dengan ciri-ciri benda abstrak membuat guru harus berinovasi dalam proses transfer pengetahuan. Namun, tidak semua guru bisa melakukan inovasi materi berbasis teknologi. Untuk itu perlu dikembangkan media pembelajaran yang berupa video pada materi segi empat agar dapat menjadi referensi tambahan bagi guru dalam pembelajaran. Video tersebut dibuat dengan aplikasi Microsoft PowerPoint berdasarkan model pengembangan ADDIE. Pengumpulan data dilakukan dengan menggunakan angket, tes, dan dokumentasi. Analisis data dilakukan secara kualitatif berdasarkan indikator yang telah ditentukan. Hasil pengembangan menunjukkan bahwa video valid menurut expert judgement dan hasil angket respon siswa setelah proses implementasi. Namun dari segi materi, video belum memberikan efektifitas dalam pemahaman matematis siswa.

Kata kunci: video pembelajaran; microsoft powerpoint; persegi panjang.

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INTRODUCTION

The coronavirus (COVID-19) pandemic has hit Indonesia since March 2020. Until now, this condition still causes various obstacles in various processes, one of which is education. One of the policies made by the government is to implement e-learning. These e-learning policies cause disruptions in the learning and assessment process (Aji, 2020). The policy also creates an obligation for teachers and students to know the course of e-learning, although not all are proficient with technology, and not all regions have the maximum network for e-learning (Anshori & Illiyyin, 2020).

Indirectly the Covid-19 pandemic forces teachers to shift direct learning into e-learning, which in practice must consider the use of technology in education (especially mathematics) to increase student involvement (Attard & Holmes, 2020). Through teachers, schools seek e-learning in various ways. In general, teachers can use multiple applications such as Ruang Guru, Google Classroom, Google Form, Zoom, WebEx, Youtube, TV Channels, or Whatsapp groups to provide material and practice questions as a form of evaluation to students (Dewi, 2020; Mansyur, 2020). However, not all subjects can be accepted readily by students through these applications.

Mathematics is a subject that requires an intensive process of understanding. Mathematics contains a variety of symbols and a fairly abstract mathematical language. Incomprehension from the start will lead to errors in students' mathematical understanding because there is no connection between mathematics concepts. Applications used in learning that have been carried out have not had a maximum impact on students because the material provided is not in accordance with student understanding, which is still not optimal. Meanwhile, mathematics learning is expected to develop students' problem-solving skills, mathematical communication, and mathematical connections (Utami, Alan, & Cahyono, 2020). For this reason, there is a need for efforts to convey mathematical concepts in a practical, straightforward way, according to the characteristics of student understanding, one of which is by making learning media.

Learning media is a means for transferring learning from teachers to students (Mahnun, 2012). Gerlach & Ely discusses the importance of developing learning media, namely: (1) fixative, (2) manipulative, (3) distributive (Santyasa, 2007). Fixative means that it can capture, store, and display an object or event again, then it can be saved and shown back in its original form when needed. Manipulative means that the media can display items or events with various changes (manipulations) as needed and the presentation can be repeated. Meanwhile, distributive means that the media can be reached by more audiences in each presentation.

In several schools in Banyuwangi, it is known that there are difficulties in implementing e-learning, especially in learning mathematics. Even though learning must still be carried out in various ways so that learning concepts can be maximally conveyed to students. For this reason, effective media is needed so that mathematics learning can be more easily accepted and understood by students, such as learning videos.

Video is said to be effective in e-learning because it contains a detailed explanation of the material to be played back if students do not understand the material (Kusumaningrum & Wijayanto, 2020). Video is a teaching material in the form of a moving image display accompanied by sound with a clear delivery flow. The teacher can make videos and then send to students via social media and used by students to learn independently from home. Video can be developed with computer applications, one of which is Microsoft PowerPoint. Video development is adapted to the current learning conditions, which must be done more with an online system but easy for students to access and understand.

Microsoft PowerPoint is a computer application used for presentation purposes and contains objects, text, graphics, video, sound, etc., and can be converted into a video format. Microsoft PowerPoint has several advantages and disadvantages in learning (Rosyid, Sa'diyah, & Septiana, 2019). The advantages are: (1) it makes it easier for users to make presentation slides; (2) equipped with various tools; (3) has a variety of templates; (4) can be exported to PDF; (5) has collaboration features; (6) there is a cloud service feature in the form of a save to one cloud option as the default storage before users put in local storage; and (7) very advanced authoring features. The weakness are: (1) only used on the Microsoft platform; (2) document instability in each version; (3) the price is too high; and (4) classified as a thought program.

Power point is often used in learning. One form of learning media that the PowerPoint application can produce is video. Making videos using the PowerPoint application is quite easy because, in PowerPoint, various templates (backgrounds) are provided. There are animations to support the movement of images and audio to export (change the file format) sound. PowerPoint is considered suitable for use in the development of instructional media. This is following the results of previous studies, such as: Microsoft PowerPoint-based media is very suitable and important to use as interactive learning media to improve students' critical thinking skills (Busra, Festiyed, & Ramli, 2015); learning media based on Microsoft PowerPoint that was developed had a potential effect on student learning outcomes as much as 83% (Marfuah, Zulkardi, & Aisyah, 2016); Macros based PowerPoint mathematics learning media is effectively applied to achieve classical completeness (Muktisari, Rasiman, & Murtianto, 2017); the development of mathematics learning media in the form of PowerPoint VBA is effectively used to achieve student learning completeness of 96,88% (Mubarok & Zahroh, 2018).

The results of these studies indicate that Microsoft PowerPoint-based instructional video media can be developed to be alternative support for learning mathematics, especially during the Covid-19 pandemic. Based on the above discussion, this study's focus is aimed at describing the effectiveness of mathematics learning videos on rectangular material. The video's material is limited to the various rectangular, the properties of the rectangular, and the perimeter and area of the rectangular.

METHOD

This study aims to develop mathematics learning videos and determine their effectiveness in the Covid-19 pandemic conditions in the context of e-learning. For the reason, videos that have been developed and declared appropriate by the validator are then uploaded to Youtube. Content links are provided to students through the teacher.

Learning videos were developed using the ADDIE model with additional validation steps after the product was produced. The implementation was carried out in five junior high schools, namely: SMP Negeri 5 Banyuwangi, SMP IT Al Uswah, SMPK Santa Maria Genteng, MTs. Puspabangsa Cluring, and MTs Negeri 11 Banyuwangi. These schools were selected because: (1) the students at the school had already done

e-learning; (2) the material contained in the media is in accordance with the intended school curriculum; and (3) there has never been a similar media development in that school before.

Respondents were students in grade 7 in each school. The data was collected by using questionnaires, test, and documentation. Questionnaires are used to determine student responses to instructional video media and material contained in the video. The student questionnaire contains a check list using the Guttman scale which consists of two choices: "YES" or "NO" (Mulyatiningsih, 2012). The test is given online, the results are uploaded via google form along with filling out a questionnaire. The test was conducted to determine the achievement of student learning completeness. Meanwhile, documentation is used as a method to collect all documentable research results, such as student test results.

While the student response questionnaire using the Guttman scale was converted by scoring as follows : YES = 1, NO = 0. Then the conversion results were analyzed to obtain the percentage of "YES" answers with the following formula.

$$\% \text{ SR} = (Y/Q) \times 100\% \quad (1)$$

Note : SR : student responses

Y : lots of "Yes" answer

Q : many questions times the number of respondents

Source : Iskani (2014)

The results of the analysis were then adjusted to the following student response standards.

Table 1. Student Response Standards

Percentage	Criteria
51% - 100%	Valid
<50%	Invalid

Source : Iskani (2014)

The test description form is given to students in 3 questions. The test results were analyzed based on the assessment guidelines that had been developed with the student test instruments. The test results are adjusted to the minimum completeness standard in this study, which is 70. The learning video is said to be effective if the media is valid based on the student response questionnaire results and the achievement of all respondents' classical completeness is at least 70%.

RESULTS AND DISCUSSION

This research was conducted from July to December 2020. The development of video was carried out using the ADDIE model. The analysis, design, and development steps were carried out for approximately three months (July – October 2020). Meanwhile, the implementation stage was carried out from October to November 2020, and the evaluation was carried out in December 2020.

The analysis step was carried out on the conditions of learning in schools, the curriculum, and the learning materials. Based on observations, literature reviews, and interviews with teachers at the target schools for implementation, it is known that the learning process in Banyuwangi is still being carried out

online and will continue until Banyuwangi leaves the red zone status. Analysis of the curriculum based on Permendikbud Number 37 of 2018 concerning Core Competencies (KI) and Basic Competencies (KD) in the 2013 curriculum, results are obtained as in table 2 below.

Table 2. Core Competencies (KI) and Basic Competencies (KD) on Rectanguler

Core Competencies (KI)	Basic Competencies (KD)
3. Understand knowledge (factual, conceptual, and procedural) based on his curiosity about science, technology, art, culture related to visible phenomena and events.	3.11 Relating the perimeter and area formulas for different types of rectangular (square, rectangle, rhombus, parallelogram, trapezoid, and kite)
4. Trying, processing, and presenting in the realm of the concrete (using, unraveling, arranging, modifying, and making) and the abstract realm (writing, reading, counting, drawing, and composing) according to what is learned in school from other sources the same in the point of view/theory.	4.11 Solving contextual problems related to the area and perimeter of rectangular (square, rectangle, rhombus, parallelogram, trapezoid, and kite).

Table 2 is the basis for analyzing the material developed in the video. Based on the limitations at the beginning of the study, the material analysis resulted in the material being produced in the learning video including : (1) the definition of rectangular; (2) various kinds of rectangular; (3) the properties of the rectangular; and (4) the concept of perimeter and area of the rectangular.

The video design includes learning goals, material development plans, and video slides. The goals are : (1) students can determine examples and not examples from the rectangular; (2) students can mention the properties of the rectangular; (3) students can determine the perimeter and area of the rectangular; and (4) students can solve problems related to the perimeter and area of the rectangular. The material design is made according to the flow in Figure 1 below.

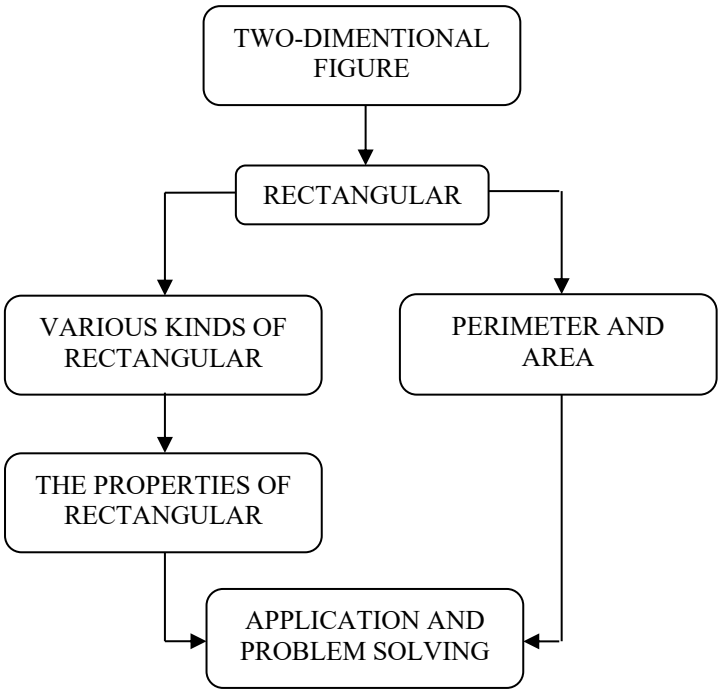

Fig. 1. Material Concept Mapping Flowchart

Furthermore, the media design was developed with the Microsoft PowerPoint application. The media is made in twenty-six slides containing the title, learning goals, concept mapping, definition of rectangular, various kinds of rectangular (square, rectangles, rhombus, parallelogram, trapezoid, and kite), the properties of rectangular, concept perimeter, and area as well as an example of problem-solving, and conclusions. An example of the slide can be seen in Figure 2 below.

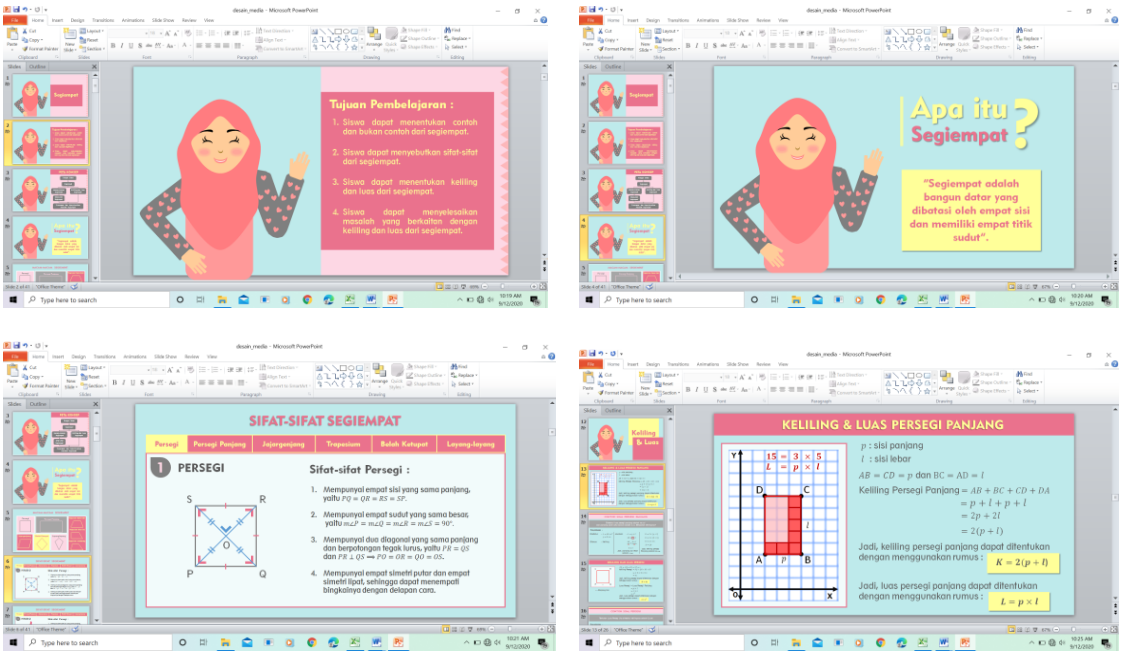

Fig 2. Examples of Slides in The Media

The slides that have been arranged are animated and given sound, then exported as a video. Videos were tested for their feasibility (validation) on material experts (7th-grade mathematics teachers) and media experts (Informatics Engineering lecturers). The validation results are obtained as in table 3 below.

Table 3. Validation Results

Results of Material Validation			Results of Media Validation		
Item	**Aspects of The Assessment**	**Score**	**Item**	**Aspects of The Assessment**	**Score**
1.	Media according to the curriculum	4,5	1.	The font size is clear and legible	4,5
2.	The learning goals are clearly stated	5,0	2.	Appealing media display	5,0
3.	The material is conveyed clearly	5,0	3.	Interesting media color combination	5,0
4.	The content of the material is according to KI and KD	5,0	4.	Media design consistency	4,5
5.	The content of the material is in accordance with the learning goals	5,0	5.	Music and media voice is clear	4,5
6.	The writing is clear and in accordance with the material	5,0	6.	Interesting image selection	5,0
7.	The language used is in accordance with the EYD	5,0	7.	Selection of images according to the material	5,0
8.	The language used is easy to understand	4,5	8.	Interesting media animation	5,0
			9.	Media animation according to the material	5,0
	Total	38,5		Total	43,5

The average validation of the material gave a result of 4,8, and the media's validation gave a result of 4,8. Both of these results indicate that the media is valid for implementation.

Videos that have been valid are then uploaded to Youtube, and the link is shared with students through teachers in each school. The implementation was carried out in five junior high schools, namely: SMP Negeri 5 Banyuwangi, SMP IT Al Uswah Banyuwangi, SMPK Santa Maria Genteng, MTs. Puspabangsa Cluring, dan MTs. Negeri 11 Banyuwangi. The implementation was followed by 7th-grade students. After giving the learning video, students were given a test, and the results were uploaded together with filling out a questionnaire via a google form. Research respondent data can be seen in Figure 3 below.

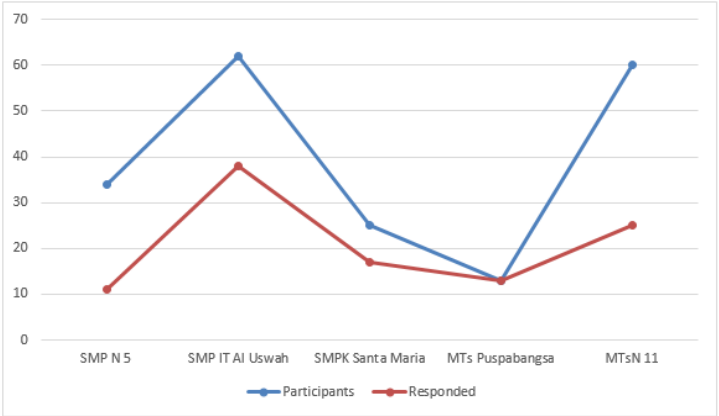

Fig. 3. Student Response Data in Filling in the Questionnaire and Uploading Test Results

The blue line in Figure 3 shows the number of students in each school who participated in the implementation (received the learning video link). Meanwhile, the red line indicates the number of students in each school who sent responses in questionnaires and tests. Based on this data, it can be seen that students' response was 32% from SMP Negeri 5 Banyuwangi, 65% from SMP IT Al Uswah, 68% from SMPK Santa Maria, 100% from MTs Puspabangsa, and 42% from MTs Negeri 11 Banyuwangi. Overall, there were 55% responses from research respondents. The results of student responses given through a questionnaire can be seen in Table 4 below.

Table 4. Results of Student Responses in the Questionnaire

Item	Questionnaire Components	Number of Answers	
		Yes	No
1.	Clarity of material	105	1
2.	Understanding of the material presented	102	4
3.	Language according to the level of discussion of the material and the level of development of student understanding	104	2
4.	The image and symbols used are easy to understand	101	5
5.	The font size is clear and eligible	104	2
6.	Language is easy to understand	102	4
7.	Appealing media display	102	4
8.	Color combinations in interesting media	102	4
9.	Music and voice sounded clear	101	5
10.	Selection of attractive images and in accordance with the material presented	103	3
11.	The use of animated media is interesting and in accordance with the material presented	100	5

Based on formula (1) in the method, the questionnaire's student response can be determined by a percentage of 97%. The student’s response shows that the video is valid to be implemented.

In addition to the response to the use of video in learning, students are also given an evaluation in tests. The test contains description questions of 3 items. Tests are given to know students’ abilities in achieving basic competencies, namely linking the perimeter and area formulas for various rectangular and solving contextual problems related to the perimeter and area of the rectangular. The test is done independently, and the results are sent in JPG or PDF format on Google Form. The results are shown in Figure 4 below.

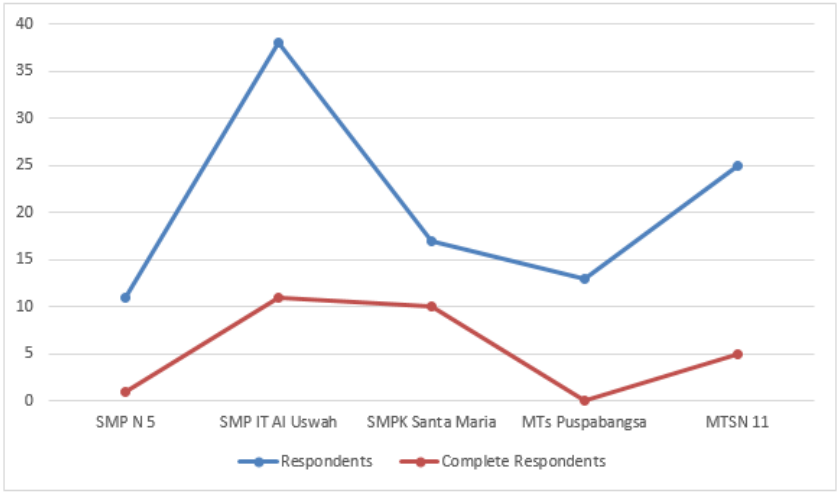

Fig. 4. Student's Test Result Completeness Data

The blue line in Figure 4 shows the number of students who uploaded test results on the Google Form, while the red line shows the number of students who completed. The percentage of completeness of SMP Negeri 5 Banyuwangi students is 9%, SMP IT Al Uswah students is 29%, SMPK Santa Maria students is 59%, MTs. Puspabangsa students is 0%, and MTs Negeri 11 students is 20%. The overall completeness percentage looks like the diagram in Figure 5 below.

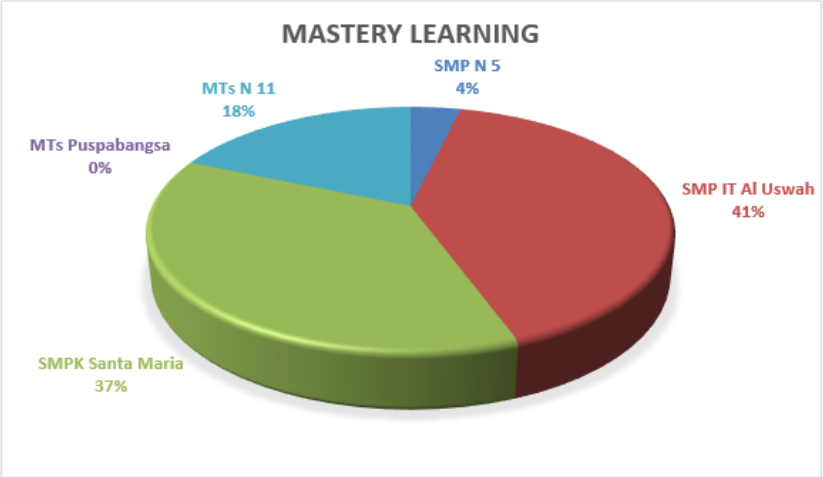

Fig. 5. The Percentage of Student Completeness

The percentage in Figure 5 is not used to compare the achievement of completeness of each school. But it is an illustration that completeness in the implementation of this research has not been maximally achieved.

Based on the results obtained in the previous five steps (four ADDIE steps and one validation step), an evaluation was carried out as the final step in this study. Evaluation is carried out to determine the effectiveness of developing videos in rectanguler material, especially in e-learning. Based on the analysis, design, and development, it is found that : (1) the media is in accordance with the applicable curriculum; (2) contains learning goals and materials that are appropriate and clearly conveyed; (3) the material is in accordance with KI, KD, and learning goals; (4) the writing is clearly legible and in accordance with the material; (5) the language used is in accordance with the EYD and is easy to understand; (6) media display,

color combination, image selection, and media animation attractive to students; (7) the design is consistent with the media; (8) music and voices in the media are clearly heard; (9) selection of images and media animation according to the material. These results indicate that the video is valid with a validation result of 4,8. This is in accordance with Hobri (2010) which states that media validation in the $4 \leq V_a < 5$ interval provides valid or feasible results to be implemented. This means that the developed media is liked by students in appearance and material. This is accordance with research Alshatri, Wakil, Jamal, & Bakhtyar (2019) which states that audiovisual-based learning media is preferred by students with a percentage of 80%, compared to visual-based learning media by 6% and audio-based media by 14%.

Implementation was carried out in five schools that had implemented e-learning during the covid-19 pandemic. Based on the results of this study, it can be seen that only 55% of students responded in the form of filling out questionnaires and uploading test results. This happens because there are still many students who have problems in the learning process with e-learning. As stated by Mailizar, Almanthari, Maulina, & Bruce (2020) the most significant obstacles experienced by students are the lack of knowledge and skills in using e-learning, as well as lack of access to devices and internet connections. Whereas the availability of supporting facilities and infrastructure as well as internet access facilities are indispensable in the e-learning process (Febrianto, Mas'udah, & Megasari, 2020). Mathematics e-learning allows students to learn more comfortably at home as long as the needs of digital devices are met, acces to the internet, affordable internet costs, and supplies electricity is adequate (Mulenga & Marbán, 2020).

The test given to students showed an average percentage of completeness of 23%. This means that there are still many students who have difficulty applying the material that has been learned in the video to solve the problems given. Even though the existence of media in mathematics learning is expected to make students understand abstract mathematical concepts and make learning more meaningful (Widodo & Wahyudin, 2018). In addition, the self-regulated of student in e-learning conditions also has a big influence. The self-regulated of students in Indonesia is low in the conditions of Covid-19 pandemic so that they are less able to regulate the e-learning process (Churiyah, Sholikhan, Filianti, & Sakdiyyah, 2020). For this reason, it is necessary to pay attention to the readiness of students in carrying out e-learning. This is in accordance with one of the prinsiples of learning practice that has a high impact in e-learning, such as : the quantity, difficulty, and length of the learing content must match the readiness of students in terms of academics and student characteristics in the e-learning process (Bao, 2020).

CONCLUSION

Technology-based learning media are urgently needed at this time, especially during the Covid-19 pandemic. However, it is possible that the need for technology-based learning media will also occur in the future. For this reason, teachers are required to be able to innovate in developing technology-based learning media, such as videos, to facilitate the learning process carried out. Based on the results of research and discussion, it is known that the learning videos developed are valid. These criteria are obtained from expert

judgment and from student responses after learning implementation. However, there are still many students who are not familiar with technology-based learning so that the media cannot be said to be effective as conveying learning messages. This can be seen from the findings in the test results which indicate the existence of inappropriate concepts and processes carried out by students.

The results of this study are the basis for the development of the next media that is more maximal in the transfer of knowledge so that students can visualize abstract concepts in mathematics more easily. The development of students' knowledge and skills regarding the use of e-learning tools also needs to be done, so that students can do more optimally in carrying out learning, especially during the Covid-19 pandemic.

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