Flat plane geometry learning media through macromedia flash CS3 program in online mathematics learning

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Abstract. A learning media is one of the many tools that are being developed by teachers to help students learn mathematics. Because of that, the learning media must be designed to fit the students’ characters. Junior high school students need a learning media that fits with the level of concrete thinking so that students are able to adapt the mathematical knowledge that are beginning to get abstract. For this purpose, scientists have tried to improve the learning media that are technology based using Adobe Flash CS3 program. The technology-based learning media using Adobe Flash CS3 have been tested in online learning practices which took part 124 students from several junior high schools in Bandung, as well as math teachers as observers. The results of this implementation show that improved computer-based learning media are responded positively by students. The students feel motivated to study, focused, and highly curious. This response is supported by their comments that the improved media is appealing, well organized system, and the animation has helped them to understand the material.

1. Introduction

The COVID-19 pandemic suddenly requires education to do online learning. The current condition is the closeness to innovating and analyzing the use of available technology to support the learning process [1]. Its practice requires both educators and students to be able to transfer knowledge online. Online learning can take advantage of platforms in the form of applications, websites, social networks, and learning management systems [2]. These various platforms can be used to support knowledge transfer.

In this pandemic era, mathematics must still be taught. Mathematics teachers have made various ways to teach abstract mathematical concepts, the nature of mathematical material is not easy to understand, mathematics has a strict and rigid hierarchy [3], the application of mathematics is less tangible in the Covid-19 pandemic. But the problem is, currently the education system is faced with a situation that requires teachers to be able to master online learning media, especially during the Covid-19 pandemic outbreak. The online education system is one of the solutions to overcome difficulties in face-to-face learning with the existence of social distancing rules considering the problems of time, location, distance, and cost which are major obstacles at this time [4]. When the Covid-19 pandemic outbreak hit the world, including Indonesia, until now it has not ended, almost all educators use online learning (not face to face). Online learning, or e-Learning, is the result of learning that is delivered electronically using a computer. The material is often accessed through a network. E-learning is also used as a very useful source of online information because E-learning does not have to be face-to-face [5]. This is in accordance with the opinion expressed by [6] that E-learning is used as independent learning for students.
One of the familiar and frequently used online learning media is the Zoom Cloud Meetings application. Zoom is an application that provides remote conferencing services by combining video conferencing, online meetings, chat, and mobile collaboration. This application is widely used as a medium of long-distance communication. As for the impact of previous studies that have been carried out including adobe flash-based mathematics learning has succeeded in improving students' mathematical reasoning skills in the concept of geometry [7], besides adobe flash-based learning can increase student learning motivation [8] and adobe flash-based learning has prospects. which is very good, if integrated in learning in schools [9].

From the results of these previous studies, an idea emerged to integrate Adobe flash-assisted learning media with online-based learning. This study aims to determine the ability of students' mathematical understanding with online learning and to determine the effectiveness of Macromedia flash media on online mathematics learning. The results of this study are expected to provide scientific contributions to the development of science, especially those related to mathematical understanding abilities. Researchers hope that the results of this research analysis can help teachers to provide alternative learning models in mathematics learning for students in class during the Covid-19 pandemic.

2. Methods

This study aims to examine student’s mathematical understanding skills through the use of online learning media for macromedia flash. Students who took part in the learning activities at the time of the study were 124 grade VII students from various junior high schools (SMP) in the city of Bandung. In selecting the subject, the researcher worked with the Bandung City Subject Teacher Conference (MGMP), the researcher selected teachers from various public and private junior high schools in Bandung, so that students who took online learning could provide an overview of all VII grade students who is in the city of Bandung. Thus, this research is a quantitative descriptive study [10].

The instrument used in this research is learning media developed through the Macromedia Flash application which has been tested in mathematics teacher training. To measure students' mathematical understanding, researchers used Bloom's cognitive indicators at the cognitive level of understanding through to analysis. This level represents a measurement of the low level of thinking (low order thinking) and the high level of thinking (high order thinking). The next instrument used in this study was a questionnaire used to measure student responses to learning media. Indicators are used to measure students' attitudes about the contribution of media in helping them learn geometry, the adequacy of exercises and questions in strengthening understanding, as well as the appearance of learning media, for example attractiveness, images, animation, sound, and color composition.

As explained above, this research is a descriptive study, so the data analysis in this study uses descriptive statistics, which is to obtain information from the data through statistical measures presented in tables and diagrams in accordance with the data measurement scale. To complement the quantitative data, qualitative information is also used which is processed from the results of teacher observations during the learning practice.

3. Results and Discussion

3.1. Results

Implementation of learning practices resulting from the development of learning media using Macromedia Flash CS3 which is done online through zoom media. Students who take part in learning activities are grade VII from various schools in Bandung. From the data obtained from Google Form, it is known that 124 students. Because learning activities are carried out in lesson study settings, in the virtual zoom room there are also teachers who are also observers. Thus, online learning activities were followed by not only students but also observers (teachers). The learning process is carried out by a model teacher who is willing to volunteer to implement learning. The material chosen in the learning practice is a rectangular flat geometry that includes squares, rectangles, and parallelograms. All
materials have been provided in the form of media using the Adobe Flash CS3 application. Thus, the model teacher can apply it in the form of online learning.

To see the success of students during learning, researchers used two assessment approaches, namely assessment of learning and assessment as learning. Assessment of learning is used to assess student success in learning rectangular flat shape material through Adobe Flash CS3 media that has been developed by researchers, and assessment as learning is intended not only for students but also for teachers who take part in the development of mathematics learning media through Adobe Flash CS3. Thus, the implementation of lesson study activities in this series of studies provides learning benefits for mathematics students and teachers.

The results of the formal test given at the end of the learning practice using a score of 10 obtained the distribution of student scores can be seen in table 1. From table 1 it can be seen that there are still 12.1% of students who answer wrong (get a score of 0) all the questions given. But there were 1 (0.8%) students who answered all the questions correctly (got a score of 10). The scores of students still gathered at scores below 6, which were 66.9% of students. This means that there is a tendency for the slope of the curve to converge towards smaller values. This can be seen from the average value, which is 5, where the mode and median are the same, namely 4. Thus, the shape of the curve from the distribution of the formative values of the students is more towards the left, i.e. the formative value data is clustered more on below-average values.

| Test Value | Frequency | Percentage |
|------------|-----------|------------|
| 0.00       | 15        | 12.1       |
| 2.00       | 31        | 25.0       |
| 4.00       | 37        | 29.8       |
| 6.00       | 29        | 23.4       |
| 8.00       | 11        | 8.9        |
| 10.00      | 1         | .8         |
| Total      | 124       | 100.0      |

If we look at the diversity, the range of student scores is very far, from 0 to 10. This shows that the formative scores of students are still very diverse, meaning that the difference in understanding ability between students in learning with learning media is still very high. This condition can be caused by the large number of students participating in the activities, namely 124 students so that the model teacher cannot fully pay attention to individual students. Thus, the use of computer-based learning media in online learning in large classes is still less effective. Apart from the very large number of students, another factor that affects learning outcomes through online computer media is the students’ informatics communication technology literacy skills. This is shown in the following pie chart.

![Figure 1. Use of Macromedia Flash CS3 Computer](image)

There are 27.2% who have never used computer media in learning, and 35.3% rarely use it. This means that more than 50% of students are not familiar with the use of computer-based learning media.
or online learning. Although students are very likely to be familiar with the use of social media through cell phones or smartphones, because the teacher has never or very rarely uses computer-based learning media or online learning, this affects their learning process during learning activities. The results of the formative test above are slightly contradicting the students' responses that the media used in online mathematics learning is able to help them understand the material being taught. The following are the students' responses to the learning media developed by researchers in understanding the rectangular shape material.

Figure 2. Student Responses to the Use of Macromedia Flash CS3 Computer Media

Although the results of the formative test are less than optimal, this response provides an opportunity that the use of learning media that has been developed can help them understand the material they are studying. This can be seen from the high response of students who strongly agree (28.7%) and agree (62.5%). Thus, the use of Computer Macromedia Flash CS3 media in mathematics learning can contribute to the efforts of teachers to help students understand. Computer Macromedia Flash CS3 media assistance in learning mathematics can be seen from the attractiveness, ease, encouragement of student curiosity, presentation of examples and exercises for strengthening, focus on learning, independence, and student motivation in learning. The following is a recapitulation of student responses to these indicators.

Table 2. Student Responses to Media Computer Macromedia Flash CS3

| Statement                                           | TD   | D     | A     | SA    |
|-----------------------------------------------------|------|-------|-------|-------|
| Learning Media contains interesting learning activities | 0.00%| 4.44% | 68.15%| 27.41%|
| Learning media is easy to use                       | 0.00%| 11.11%| 65.93%| 22.96%|
| Learning mathematics with the learning media used encourages curiosity | 0.00%| 6.67% | 69.63%| 23.70%|
| The presentation of examples in the exercise helps better understand the material being studied | 0.00%| 6.67% | 66.67%| 26.67%|
| The learning media used make learning more focused | 0.00%| 17.78%| 62.22%| 20.00%|
| Learning Media can help me learn independently       | 0.00%| 7.41% | 73.33%| 19.26%|
| Learning media increase motivation to learn further  | 0.00%| 5.93% | 70.37%| 23.70%|

The results above show that there are homogeneity and consistency of students' positive responses to learning media in various aspects. Motivation to learn is the highest factor that has responded very well to the use of learning media that has been developed, followed by independence, curiosity, attractiveness, ease of use, and presentation that is sufficient to help them improve their understanding of the material being studied. This data provides information that the learning media developed through Adobe Flash CS3 which is implemented in online learning has a positive response from students. A positive response to the indicators above is very likely influenced by the appearance in the media being developed. This can be seen from the good student responses to animation, pictures, harmony, and
sound. As many as 70.06% of the students agreed and 23.5% agreed that animation on the media helped them understand the material they were learning. Then 66.9% agreed and 25.6% strongly agreed that the media appearance was very attractive. Likewise, for the layout and color compatibility, more than 90% responded to a good response. Thus the media used can be said to have good aesthetic value so that it has a positive influence on students' focus in learning as the findings above.

3.2. Discussion

The enthusiasm of students in participating in learning is largely determined by the creativity of the teacher in the development of learning media [11] notes that the development of learning development with digital technology is necessary for a professional process that includes teachers' initial abilities in technology, technological developments and pedagogical knowledge. Learning media will run well and be interesting, encouraging students to want to work and think. Supporting adequate facilities to develop this learning media is needed. Because it could be that the research results from [12] stated that "The lack of optimal facilities and infrastructure provided by several schools to support the application of ICT-based learning media, so that the teaching staff are not challenged to innovate in applying ICT-based learning media to get better learning outcomes. better ". For these needs, the researchers used Adobe CS3 as a tool used in the development of learning media. The following is a picture of the Adobe Flash CS 6 learning media developed in the study:

![Figure 3. Home menu display](image1.png)

![Figure 4. Procedural Exercises with Student Answer Feedback](image2.png)

Why Adobe CS3? The results of the questionnaire given at the beginning and end of the training show that Adobe CS3 is easy to obtain and easy to install. Then from the results of the questionnaire showed an increase in participant responses to appearance, attractiveness, image quality, sound quality, creativity, and according to the 2013 mathematics curriculum. [13] stated that a multimedia learning system combines elements of video, sound, text and graphics. has the individual potential to attract the attention of students. The increase in participant responses at the level of strongly agreeing to these aspects was an average of 7.43%. A fairly high increase was obtained in the response to the image and animation aspects, which was around 14%. Thus, the power of animation and images can be said to be a distinguishing aspect of Adobe CS3 compared to other applications used in the development of learning media.

The use of media at the time of implementing offline learning has not provided very satisfying results. The formative results given after the implementation showed that there were 12.1% of students who were unable to answer all the questions correctly (obtained a value of 0). This result is a bold learning process that is developed that still requires adaptation for students. The face-to-face learning habits that have long been carried out by students have not yet fulfilled can be changed with virtual patterns or approaches. In addition, the use of media which is only demonstrated by the teacher has not provided an optimal means for increasing student understanding. Students only look at the monitor screen and tend to be passive, nervous because they don't know each other's friends (a class contains a mixture of
students from various schools), and it is very possible that there are students who are not technology-savvy. Therefore, the habit of using communication and information technology in learning practices needs to be done immediately by schools / teachers. Besides, there were 12.1% of students who were unable to answer all the questions, 0.8% (1 person) of students answered all the questions correctly (got a score of 10). Although very little, but this fact is quite encouraging. When viewed as a whole, the scores of students still gathered at values below 6, namely as many as 66.9% of students with an average score of 5 (SMI = 10). This means that the use of learning media with the Adobe CS3 application through online learning has not been able to provide optimal results in student cognitive achievement.

However, from the results of observations made by the teachers through observations of the students' monitors, some concluded that enthusiastic, enthusiastic about answering, enthusiastic about fun, enthusiasm even though different from face to face, followed well, worked well, and was quite clear and students could understand. These results reinforce the findings of according [14] that digital learning is able to significantly increase student motivation with a higher level of motivation compared to the motivation of students with traditional learning. In addition, digital learning has potential opportunities to improve student learning outcomes. If we look at students' interactions with the teaching materials of this study, it can be said that they are similar to the findings of [15]. Enthusiasm and student satisfaction as a result of his research, the effect of being very interested in the use of digital learning. From the results of teacher observations in this study also provided information that students were very focused on paying attention to the teacher who taught them, besides that there were some students who were looking for material via the internet. Thus, the use of instructional media in settings is able to provide good motivation in student learning.

The observer's assessment of student understanding through learning media during learning generally assesses that the assessment of students can understand the material, but also does not meet all students can understand it well. This is very likely due to the difficulty teachers have in monitoring the students as a whole. This weakness in virtual learning was also found by [16]. The results of his research found that teachers had difficulty increasing competence due to not using facilities that could be used in virtual learning. The results of the learning research are for good preparation in the use of virtual media for learning activities. Results from research [17] Macromedia Flash which combines images, animation, video and sound into a single unit depicted in a scene or animated frame can make learning more attractive to students and can help teachers to facilitate the delivery of learning and sharing of knowledge. Development of instructional multimedia for mathematics based on adobe flash is feasible to use in mathematics learning as an attempt to overcome students' difficulties in understanding mathematical concepts [18] communication skill [19] and mathematical reasoning [20][21]. Besides being able to improve mathematical skills, technology-based learning can also improve student self-regulated learning, so that technology-based mathematics learning has good prospects for continuing research[22].

4. Conclusion
The results of this implementation show that improved computer-based learning media are responded positively by students. The students feel motivated to study, focused, and highly curious. This response is supported by their comments that the improved media is an appealing, well-organized system, and the animation has helped them to understand the material.

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