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Research Article

Development of triangular learning media based on adobe animate CC with ADDIE learning design

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ABSTRACT

This study aims to systematically develop technology-based interactive learning media to im-prove students' problem-solving and reasoning skills. This research is development research, namely the development of learning media based on Adobe Animate CC with ADDIE learning design on triangle material. The subjects of Adobe Animate CC learning media development are SMPN Bengkalis Regency students. The research instrument used is a validity assessment sheet for experts and practitioners. Data analysis uses descriptive statistics to see the percentage of an-swers from experts and practitioners and then compares them with standards of validity and practicality. The development results show that the created Adobe Animate CC has illustrations that can attract students' attention and interest (motivation) in learning mathematics. Experts and practitioners assess Adobe Animate CC learning media in the correct category with an average value of 81.55%. Experts and practitioners also estimate that Adobe Animate CC learning media is in the practical type, averaging 84.03%.

Keywords: macromedia flash 8; learning media; similarity and congruence

1. INTRODUCTION

Mathematics is defined as the science of logic, numbers, and space that requires reasoning. Mathematical reasoning skills can help overcome students' difficulties in learning mathematics related to logic, numbers, and space (David & Dedek, 2022). Mathematics is a subject considered difficult at school because learning it requires a high level of thinking, so some students say mathematics is a complex and dull subject (Dila & Zanthy, 2020). This is reinforced by the findings in the field that the mathematical ability of students in Indonesia is still relatively low (Mahadewi et al., 2020). Mathematical reasoning is reasoning about mathematical objects needed to draw a conclusion or make a new statement based on several statements whose truth has been proven or assumed previously (Kusumawardani et al., 2018). Mathe-matics is a material that contains regular patterns and orga-nized structures in one area of life, namely studying the nature of understanding the patterns of change that occur in the real world and human thought (Dwidarti et al., 2019). Given the importance of mathematics, mathematics needs to be understood and mastered by all levels of society, especially in schools (Dhanil & Mufit, 2021).

The learning process will be difficult to succeed if there is no guidance from the teacher; this is because to produce effective learning, students must also have good behavior (Dedek Andrian et al., 2020). This is of course a challenge for teachers to still be able to create a fun, inter-esting and active learning atmosphere (Yulia & Putra, 2020). Teachers have a role in supervising and evaluating students' abilities and trying to improve learning so students can achieve satisfactory results (Samsudin, 2020). It has been found in the field that there are still teachers who cannot create good learning conditions because of the teacher's lack of knowledge and skills. (Buchari, 2018). In addition, in face-to-face learning before the COVID-19 pandemic, teachers only used some teaching aids, such as still images and transparency media in learning mathematics. The use of these teaching aids is also not used routinely in learning, and this is due to the lack of ready-to-use media (Amin & Sumarni, 2021).

One solution that can be considered is by increasing technology ability (Fathonah & Bukhori, 2021). The way to create an atmosphere of learning mathematics to be fun is to create a learning media that can attract the attention of students (Abdullah & Yunianta, 2018). The role of the media in the learning process for students is significant. In addition to making it easier for teachers to teach, suitable media can help students understand the material being taught (Rachman, 2018). Exciting and interactive learning media can arouse students' motivation and interest in studying the material provided by the teacher so that it will make it easier for students to understand it (Marthani & Ratu, 2022). The existence of the latest innovations in learning mathematics by utilizing learning media can arouse students' desire to learn mathematics and reduce students' anxiety and boredom in learning mathematics. (Yuliana et al., 2018). The benefit of learning media is to provide guidelines for teachers to achieve learning objectives so that they can explain learning materials in a systematic

order. Learning media helps in presenting exciting material to improve the quality of learning. Learning media that are designed to the maximum can increase stu-dents' motivation and interest in learning so that students can think critically and analyze the subject matter given by the teacher properly (Ferdiansyah; et al., 2020).

One of the exciting media to be applied in learning is Adobe Animate. Adobe Animate is one of the many software that can produce new features that can be used in the field of education by combining the concept of learning with audio-visual technology, which can improve learning outcomes. (Saniriati et al., 2021). Adobe Animate CC is a program that can create vector and bitmap animations suitable for creating interactive, attractive, and dynamic websites. (Yuwita et al., 2019). This research is designed with Adove Animate CC and it is hoped the students interest and motivation will be in-creased maximally after studying with Adove Animate CC.

One of the learning models that can be done to improve student learning outcomes is the ADDIE learning model (Ulum et al., 2020). ADDIE learning design is a learning design model that uses five stages/steps in its learning, namely Analysis, Product Design, product development, and product validation stages Product Development, Implementation, Evaluation (Cholifah et al., 2021). The development process can be carried out by testing a team of experts, and research subjects individually, on a limited scale, and on a wide scale (in the field), and revisions are made to perfect the final product. Although the development procedure is relatively short, it includes a testing and revision process so that the developed product can meet the criteria for a good product and is empirically tested (Cahyadi, 2019). It is hoped that after participating in learning using the ADDIE learning design, which is integrated with Adobe Animate, students will have a learning experience. Students are expected to obtain satisfactory final results. Learning with ADDIE design can increase the effectiveness and skills of students. this can create a learning process that is not monotonous so that students are interested in learning and follow the maximum learning that has been designed. Based on some of the problems above, developing appropriate or valid media based on Adobe Animate CC with ADDIE learning design is necessary.

2. RESEARCH METHOD

The study method used in this research is the Research & Development (R&D). The R&D method is a research method that produces the latest innovations, whether in the form of a new product or developing an existing product to make it more attractive and follow the learning objectives of a particular subject (Muqdamien et al., 2021). The ADDIE model consists of 5 stages: Analyze, Design, Development, Implementation, and Evaluation. This ADDIE model can be used as a research method to develop teaching materials and others. The product will be developed and produced in Adobe Animate CC learning media, which will be applied through triangle material to class VII at SMPN in Bengkalis Regency. The selection of triangle material is easier for teachers to explain and provide examples related to triangles, so teachers do not need to bring props and other media. The data collection technique in this study is to provide a validity sheet to the expert validator. The data collection instruments in this study consisted of material and media expert validation sheets, practicality sheets, and student response questionnaires. The data obtained will be calculated in a quantitative de-scriptive way that refers to the validity standard Zakiy et al., (2018) that can be checked in **Table 1**.

The development procedure starts with a preliminary study by selecting materials, learning media, and learning design models. Furthermore, development is carried out by designing Adobe Animate CC learning media which includes several things, including determining the material to be applied in Adobe Animate CC, introduction to learning media, content standards and competency standards, materials, and questions. Then the validity test is carried out by media and material experts for the research and development products that have been completed. At this stage, it is done by testing whether or not the Adobe Animate CC learning media is being developed along with the weaknesses and shortcomings of Adobe Animate CC learning media using the ADDIE learning model. After passing the product validity test stage, the weaknesses and shortcomings of the Adobe Animate CC learning media are visible. At this stage, improvements and improvements were made to the Adobe Animate CC learning media. Product revisions are based on analysis and validity tests with various criticisms and suggestions from validator experts.

Furthermore, the results of the expert validator's assessment of the learning media listed on the validation sheet will be analyzed using the following formula. Validation Percentages = *(Acquired Score: Maximal Score) x 100%*
For the criteria for the level of validity of the learning media used can be seen in **Table 2**.

Table 1. Expert Assessment Score

Criteria	Scores
Very Good (SB)	4
Good (B)	3
Quite Good (CB)	2
Poorly (KB)	1

Table 2. Criteria for the level of validity of the learning media

Scores	Intervals	Descriptions
4	85% < Score ≤ 100%	Very valid, can be used without revision
3	70% < Score ≤ 85%	valid, can be used with minor revision
2	50% < Score ≤ 70%	Quite valid, can be used with mayor revision
1	0% < Score ≤ 50%	In valid, cannot be used

3. RESULTS AND DISCUSSION

3.1 Analysis Stage

The development procedure starts with a preliminary study by selecting materials, learning media, and learning design models. Furthermore, development is carried out by designing Adobe Animate CC learning media which includes several things, including determining the material to be applied in Adobe Animate CC, introduction to learning media, content standards and competency standards, materials, and questions. Then the validity test is carried out by media and material experts for the research and development products that have been completed. At this stage, it is done by testing whether or not the Adobe Animate CC learning media is being developed along with the weaknesses and short comings of Adobe Animate CC learning media using the ADDIE learning model. After passing the product validity test stage, the weaknesses and shortcomings of the Adobe Animate CC learning media are visible. At this stage, improvements and improvements were made to the Adobe Animate CC learning media. Product revisions are based on analysis and validity tests with various criticisms and suggestions from validator experts.

3.2 Design Stage

The design stage is the core stage of this development research, where the media developed at this stage is designed. Several things are designed at this stage, among others: (1) the de-velopment of triangular material in the media; (2) media background or theme with Adobe Animate CC, (3) distinctive characters on media, (4) media working, (5) media name de-termination. This media uses the theme of hill scenery with several triangular shaped images after the material is devel-oped. The concept follows the current Z generation, which cannot be separated from technology.

3.3 Development Stage

This media development uses Adobe Animate CC 2018 soft-ware. Adobe Animate is a graphic software that creates var-ious animations, interactive websites, learning media, and games. The display of buttons and sharing images on this media was created using Coreldraw 2017, while the material and answer choices were made using Microsoft Office Power word 2010. The opening page has a display that can be seen in **Figure 1**. On this page, there is the title of the material being developed, the sound icon from this media's background music, and the icon to exit media. After that, click the button (▸) at the bottom center to go to the main menu.

Figure 1. Home Page View

After pressing the button (▸) The main menu will appear on this learning media. This display contains five main menus, namely instructions for use, core competencies (KI), basic competencies (KD), materials, quizzes, and profiles of this media developer. The main menu display can be seen in **Figure 2**.

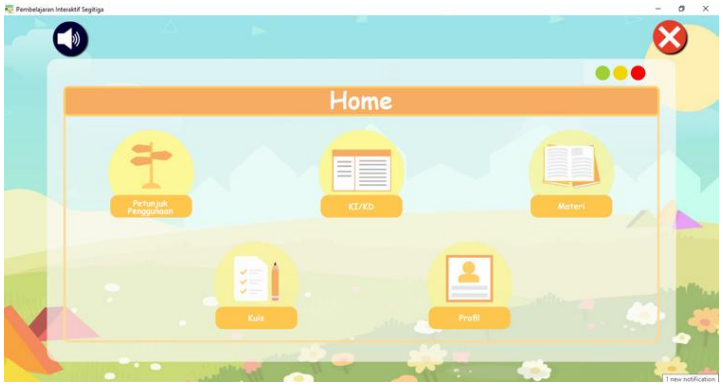

Figure 2. Home Page View

The display on the user manual can be seen in **Figure 3**. In this display there is an explanation of the function of each button on each page.

Figure 3. User Guide Page Display

The display on the KI/KD page can be seen in **Figure 4**. The display on this page describes the Core Competencies (KI)/Basic Competencies (KD) in the triangle material.

Figure 4. KI/KD Page Display

The display of the material page can be seen in **Figure 5**. This view conveys the triangle material that will be taught.

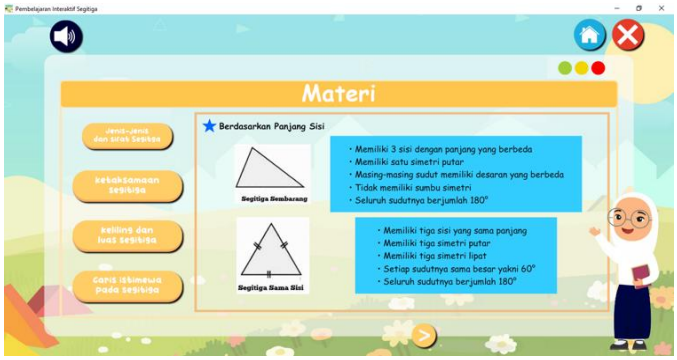

Figure 5. Material Page View

The quiz page display can be seen in **Figure 6**. When pressing the quiz icon, a display will appear that requires students to fill in their identity in the form of name and attendance number. start icon to direct students to the quiz questions presented.

Figure 6. The quiz page display

After pressing the start icon, the quiz questions page will be displayed as shown in **Figure 7**. In this display, students can choose one of the answers provided. After students choose the answer that they think is correct, a button (›) will appear on the quiz question display to direct students to the next question. After completing the quiz questions, the results obtained will be displayed.

Figure 7. Quiz Question Page Display

The profile page view can be seen in Figure 8. This view describes the profile/identity of this media developer.

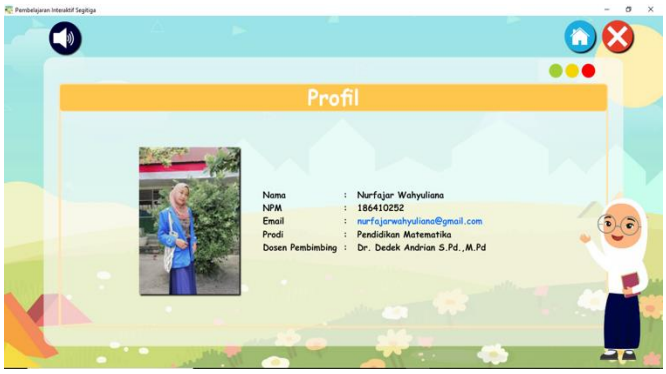

Figure 8. Profile Page Display

The media that has been developed is then assessed by media experts, material experts, and teachers. This assessment aims to get criticism and suggestions that are useful in improving the media before it is applied to learning.

3.4 Evaluation Stage

This evaluation stage aims to find out the weaknesses of Adobe Animate CC-based learning media, learning outcomes, and the arrangement of plans in learning. The results of this stage are used as the basis for improving the Adobe Animate CC learning media in the development of triangle learning media. The analysis of student opinions indicates that Adobe Animate CC media can help students learn triangle material. An attractive and easy-to-understand design can increase student learning motivation. Overall, the Adobe Animate CC learning media received a positive response from students. One of the student responses is that this learning media has an attractive appearance, is easy to use, and attracts student learning interest.

Table 3. Media Expert Validation Assessment Results

Assessment of Components	Sum of Assessment Score (%)	Criteria	Conclusions
Material	72,22%	Valid	Worth using with a little revision.
Ilustrations	93,75%	Very valid	Can be used without revision.
Quality and Media Display	75%	Valid	Learning media can be used with a little revision.
Attractiveness	87,5%	Very valid	Can be used without revision.

The results of the validity test in terms of the media aspect resulted in a validity index of 82.11%, included in the valid category, and this is because the media has an illustrated and attractive appearance that can attract students to be more motivated in learning and the media can also be used offline on all desktops.

Table 4. Results of Material Validation by Expert

Assesment of Components	Sum of Assessment Score (%)	Criteria	Conclusions
Content Eligibility	80,5 %	Valid	Learning media can be used with a minor revision.
Language	87,5 %	Very valid	Can be used without revision.
Presentation	75 %	Valid	Learning media can be used with a minor revision.

The results of the validity test in terms of material aspects produce a validity index of 81%, which is included in the valid category. This is because the material in this media has coverage by KI/KD and diversity of questions. This indicates that Adobe Animate CC media is valid for use with minor revisions.

Table 5. Teachers Response on Adobe Animate CC learning media

Validators	Score Average	Criteria
Validator 1	84,72 %	Practical
Validator 2	83,33 %	Practical

As seen in **Table 5**, it can be concluded that the assessment of practitioners (responses/responses) by experts and expert teachers on Adobe Animate CC learning media obtained an average score of 84.72% and 83.33% with practical criteria. As for seeing the results of the assessment on each point of the Adobe Animate CC learning media in **Table 6**.

Table 6. Teacher's Response to Each Point Against Adobe Animate CC Learning Media

Validators	Development Products	Assessment Score (%)	Criteria
Validator 1	Media Display	87,5 %	Very Practical
	Media Content	83,33 %	Practical
	Attractiveness	83,33 %	Practical
Validator 2	Media Display	87,5 %	Very Practical
	Media Content	75 %	Practical
	Attractiveness	87,5 %	Very Practical

Based on the results listed in **Table 6**, the number of practicality test scores on Adobe Animate CC learning media can be concluded that the average number of assessment scores by teachers on the use of Adobe Animate CC learning media with ADDIE learning design is 84.025% with practical criteria and learning media Adobe Animate CC with ADDIE learning design can be used in learning. The results of observations during the research and development of Adobe Animate CC media on triangle material carried out by researchers obtained several findings; in general, students felt interested and enthusiastic about the Adobe Animate CC media. This was because the media developed was interesting, not boring, and became an arena for competition between students working on problems in the media. In the teacher's opinion, the Adobe Animate CC media on triangle material that can be played on the desktop can add insight to teachers and students about media that can be used in learning.

Based on the expert and practitioner validation test, the learning development product was declared valid and practical to be used as a learning medium in improving students' reasoning abilities in solving problems systematically. Valid and practical the learning media will give the best practice in learning activities (Danielsson & Wiberg, 2006; Rochmad, 2012). Valid and practical learning media become the best issue to implement a maximum of learning activities (Spikol & Eliasson, 2010). It should be the attention of every educational stakeholder because learning that is run without the truth procedure will generate bad results (Thomas et al., 2015). Every educational stakeholder is needed to think about how to give valuable experience to students, and this only can be carried out by developing the new educational product like the interactive learning media (Root et al., 2020). Developing media will be an effective strategy to get the best learning practice so students can feel something new that makes their motivation and interest better than before.

4. CONCLUSION

Adobe Animate CC-based interactive learning media with the ADDIE learning model at SMPN Bengkalis District on the Triangle material produces valid and practical learning media. The media is suitable for learning activities, easy for teachers to use, and helps students understand concepts. Adobe Animate CC learning media is limited to triangle material. Therefore, further researchers can develop interactive learning media based on Adobe Animate CC on other mathematics materials. The average press and material validation results are 81.55%, with valid assessment criteria. The average number of practicality test scores for development products is 84.03%, with practical criteria and good learning media. Based on the media validation criteria, the Adobe Animate CC learning media with the ADDIE learning model is effectively used in learning.

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AUTHOR'S CONTRIBUTIONS

The authors discussed the results and contributed to from the start to final manuscript.

CONFLICT OF INTEREST

There are no conflicts of interest declared by the authors.

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