

Develop of Learning Media

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Development of Learning Media for Flat-Sided Based on The Macromedia Flash 8 Application

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Abstract. *This development aims to produce flat-sided geometry learning media based on the application of Macromedia Flash 8 at the high school level and meets the valid category that can help teachers deliver material and assist students in understanding flat-sided geometry material in learning mathematics through learning media. To produce learning media development products for flat-sided spatial construction based on the Macromedia Flash 8 application, the researcher refers to the 4-D development model with 4 stages of development, namely: [12](#) ne, design, develop, and disseminate. However, due to the coronavirus pandemic situation, in this study, researchers [only carried out](#) research up to the development stage. This learning medium is equipped with instructions for use so that it is easier to operate. The final prototype of the developed learning media consists of several menu options, namely, the opening page, menu page, profile page, concept map page, competency page, material page, practice question page, and evaluation page. The validity value developed was tested for validity by validators of material experts and media experts. The results of material expert validation, with an average of 95%, are in the very valid category, while the results of media expert validation, with an average of 84%, are in the very valid category. Based on this, the mathematics learning media based on the Macromedia Flash 8 application meets the criteria for validity with a very valid category and the product is ready to be tested.*

INTRODUCTION

Mathematics is one of the elements in systematic education and science, so that it requires people who study it to continue to develop the concepts they have so that mathematics has the nature, means of thinking, and special characteristics of other sciences. Understanding mathematics requires the ability to understand one of the concepts. Learning mathematics with an understanding of concepts requires students to be able to relate and apply it in everyday life ¹. Objects that are abstract in mathematics cause students to have difficulty understanding the subject matter as well as the material properties of spatial structures. This is because, in the material section, students must distinguish between the properties of spatial structures in the form of images and the shape of real objects ². Therefore, a learning medium is needed that can help students understand the material. This material requires tools or media that are interesting in nature, and students better understand the parts of a flat side space, which include: planes (sides), edges, corner points, space diagonals, diagonal planes, and diagonal planes ³.

Macromedia Flash 8 is one of the products that is quite widely used today, especially as a learning medium. There are so many sites that use Flash as supporting software, or even as the main software in web creation. Apart

from being an animation software, Macromedia Flash 8 can also be used for making learning media. Flash capabilities are quite popular among creators of interesting animations and web applications⁴.

The use of technology-based learning media is still very minimal and only uses Microsoft PowerPoint as a learning medium in delivering subject matter⁵. Especially for the subject matter of spatial geometry, students should clearly understand the parts of the spatial structure. However, the learning media used are less attractive and less motivating for students. Therefore, it is necessary to develop interesting learning media according to the needs of students. How is the final prototype of the validity results of the flat-sided spatial learning media based on the Macromedia Flash 8 application to produce learning media for learning to build flat-sided spaces based on the application of Macromedia Flash 8?

METHOD

Learning media is a vehicle for distributing learning information or distributing messages to students in order to better understand the material to be taught so that the objectives of learning are achieved⁶.

The learning multimedia used in this development is Interactive Multimedia, which is designed with the help of Macromedia Flash 8 software so as to produce media that is equipped with a controller that can be operated by its users, so that interactive multimedia users are more flexible in choosing what they want for the next process.

A flat side space is a spatial shape whose side plane is composed of several flat shapes. Build flat side spaces that will be discussed in the media, including blocks, cubes, prisms, and pyramids⁷.

The elements, or parts of building space, are as follows; the field (side) is a flat shape that composes the shape of the space ; a rib is an intersection of two fields in the form of a line ; the vertex is the intersection of the three edges; the plane diagonal is a diagonal that is located in the plane forming the shape of the space or on the side of the building; a space diagonal is a line that crosses space, connecting two vertices that are not in the same plane; a diagonal plane is a plane that crosses space in the form of space. With a large number of employees in an institution, it is easily forgotten by those who handle it.

The Stages of Development That are Applied to the Learning Media

Build Flat-Sided Space

The development of this learning media goes through stages using a 4-D development model, which consists of defining stage, namely, conducting a needs analysis by collecting information on the extent to which this development needs to be carried out, paying attention to and adjusting the learning needs for secondary students by doing; preliminary-late analysis aims to find and define the basic problems encountered in learning mathematics in secondary schools. The initial-late analysis includes an analysis of the applicable curriculum and is done according to the basic competencies of the material; student analysis, performed at the start of planning by observing students' learning motivation, abilities, and experience, both individually and in groups; material analysis is the identification of the components of the material to be taught to students on a concept map to facilitate student learning; the specification of learning objectives is carried out to convert the objectives of student analysis and material analysis based on curriculum competencies and concepts identified in the flat-sided geometry material⁸.

The design stage this stage, the process of designing learning media is carried out, starting from collecting material materials that will be included in the learning media. Here are the steps in designing this media he selection of media is adjusted to the results of the material analysis that has been done previously, the choice of format is intended to design or design the content of learning media that has been adapted to the learning materials and curriculum used, a preliminary design is a media design that was made before the trial⁹.

The Development phase contains the product design realization activities. The conceptual framework is still realized into a product that is ready to be implemented, at this stage it requires a validation process by several experts, namely, material experts and media experts followed by revisions and suggestions from the validator. Learning media development design with 4D can be seen in Figure 1.

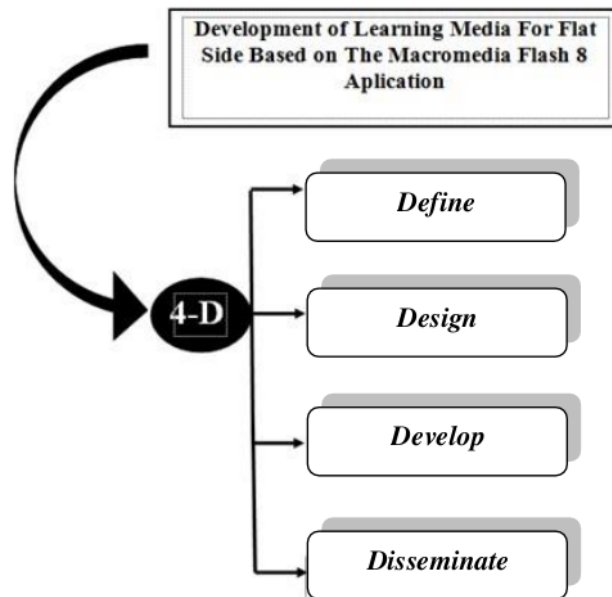


FIGURE 1. Learning Media Development Design With 4D

Data Collection Technique

The data collection technique is the validity data obtained from the validation questionnaire sheet. Validation questionnaire sheets were used to obtain data about the quality of the developed learning media. Validation sheets will be given to four competent validators.

Data Analysis Technique

Data analysis techniques were used to obtain high-quality, flat-sided wake-up learning media products based on Macromedia Flash 8 and meet the aspects of validity.

Qualitative Descriptive Analysis: used to process data from the review of material experts in the field of mathematics, media experts, teachers, and supervisors. This data analysis technique is carried out by grouping information from qualitative data in the form of input, feedback, criticism, and for improvement in the questionnaire and interview results. The results of this analysis are then used to revise the developed product.

Quantitative Descriptive Analysis: used to process data obtained from a questionnaire validation of learning media by experts. is conducted before the instrument is used to test its feasibility. The activities carried out in the process of analyzing the validity of the learning media are instrument sheets filled out by validators of media experts and material experts. The validator fills the validation sheet with a check mark on a scale of 1-4 as shown in Table 1.

TABLE 1. Expert Validation Assessment Score

Description	Score
Very Relevant	4
Relevant	3
Quite Relevan	2
Less Relevan	1

Furthermore, based on the validation sheet that has been filled in by the validator, the validation can be determined using the following formula:

$$Percentage = \frac{\sum \text{item score}}{\text{maximal score}} \times 100\%$$

Based on the percentage results then categorized according to the following validation category can be seen in Table 2.

TABLE 2. Expert Validity Kategori

Percentage	Category
0 – 20	Invalid
2 – 40	Not Valid
41 – 60	Quite Valid
61 – 80	Valid
81 – 100	Very Valid

The learning media developed in this study are interactive multimedia-based media and are packaged in the form of a Compact Disk (CD) or can also be saved via a flash drive in the form of an exe file format that makes it easier for teachers to deliver learning materials.

RESULT AND DISCUSSION

The tests given for this system are validated by material experts and system design experts by showing an existing prototype in Figure 2, and sample display of material menu learning can be seen in Figure 3.



FIGURE 2. Display of User Manual Book ; In Using This Media Application, A User Manual Is Also Provided So That Easier For Teacher To Use The Application;



FIGURE 3. Sample Display of Material Menu Learning

This material requires tools or media that are interesting in nature and students better understand clearly the parts of a flat side space which include: planes (sides), edges, corner points, space diagonals, diagonal planes, and diagonal planes. The result can be seen in Table 3 and Table 4.

TABLE 3. Results of Material Expert Validation

No.	Aspect	Validator		Max Score	%	Criteria
		1	2			
1	Material Quality	27	27	56	96.42	Very Valid
2	Material Suitability	14	16	32	93.75	Very Valid
	Amount	41	42	88	95.45	Very Valid

TABLE 4. Results of Media Expert Validation

No.	Aspect	Validator		Max Score	%	Criteria
		1	2			
1	Convenience	11	15	32	81.25	Very Valid
2	Appearance	12	14	32	81.25	Very Valid
3	Writing	14	15	32	90.62	Very Valid
	Amount	37	44	96	84.37	Very Valid

The results of the analysis of the four validators, namely the average percentage of validation of the material/content of learning media is 95.45% with a very valid category. The average percentage of learning media validation is 84.37% with a very valid category. So it can be concluded that the learning media for flat-sided geometry based on the macromedia flash 8 application developed by the researcher is in the very valid category.

CONCLUSION

The researcher developed the learning media through the following stages: 1) Define stage, where at this stage the researcher found and determined the basic problems faced in learning mathematics at the junior high school 2) Design stage (design) at this stage the researcher designs learning media that contained several contents including: home, researcher profile, concept map, competention, menu of flat-sided building material, sample questions and evaluation questions. 3) the Develop stage, the researcher conducted a test of the validation of the learning media to determine the validity of the final form of the learning media.

Mathematics learning media based on Macromedia Flash 8 application development was validated by four validators consisting of lecturers and mathematics teachers at the junior high school level. The development learning media met the validity criteria with a very valid category based on the validation results of the two material experts with a percentage of 95.45, and the validation results of the two media experts were in the very valid category with a percentage of 84.37.

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