DEVELOPING MATHEMATICS LEARNING MEDIA WITH MACROMEDIA FLASH 8 APPLICATION ON THREE DIMENSIONS GEOMETRY

Dhamar Widya Safitri[a], Uswatun Khasanah[b]
Program Studi Pendidikan Matematika Universitas Ahmad Dahlan
Jalan Ring Road Selatan, Tamanan, Banguntapan, Bantul Yogyakarta
[a]dhamar.safitri@gmail.com, [b]uswatun.khasanah@pmat.uad.ac.id

ABSTRACT

Macromedia Flash 8 is still something new in the process of learning mathematics. Even though one of these computer applications can create exciting media for the student, the student will experience different learning styles using a computer to learn. This research aims to design, develop, and find out the qualitative categories and the feasibility of learning media of mathematics based Macromedia Flash 8 on Three Dimensions for 10th Student of Senior High School. The research uses the development method of Research and Development. The development stages are Analysis, Design, Development, Implementation, and Evaluation (ADDIE). This research subject is the matter expert, the media expert, 10th students of Senior High School of Muhammadiyah (SMA Muhammadiyah) 5 Yogyakarta, and 10th students of Senior High School of Muhammadiyah 6 Yogyakarta. This study used the instrument of questionary. The data analysis technique was conducted quantitatively to test the advisability of developed learning media. The research results showed the advisability of learning media, 76.33 from the subject aspect, and 111.33 from the media aspect. The student's response has an average of 65.20 on a limited class trial and 64.49 on a significant class trial. For the learning media developed, the average score of the final assessment is 317.35, with the category of Excellent and Feasible for use as learning media for the Subject of Three Dimensions for 10th student of Senior High School.

Keywords: Three Dimensions, Learning Media, ADDIE.

INTRODUCTION

Mathematics is one of the most critical subjects in education. Besides, mathematics is the foundation in the development of science and technology. However, not a few students who have difficulty learning, in this case, understand mathematics. Based on the results of interviews with the two teachers, some information was obtained. One of them is the lack of use of computer laboratories in learning mathematics. Computer laboratories are only used in computer studies. This is because there are not many computer-based mathematics learning media that use Macromedia Flash 8 applications. Also, students feel that the existing media is less attractive.

Students also obtained information that students need learning media for Dimension Three material based on the interview results. Students are required to construct shapes in the form of space in the Three Dimensional material. However, sometimes students have difficulty in constructing shapes of shapes and shapes. The development of the times is marked by the development of scientific and technological progress. The process of teaching and learning also needed development, namely by using computers as learning media. One application that can be used in computer-based learning is the Macromedia Flash 8 application.

Macromedia Flash 8 is done because, in this application, learning media makers can create more diverse animations than using slides on Microsoft PowerPoint. The animation produced by Macromedia Flash 8 has a unique attraction for students as users. Students will also get a different learning experience by using a computer as a learning tool than when learning with books. Students are required to imagine the form of building space when understanding the Three Dimension material. However, sometimes students have difficulty constructing Dimension Three forms so that learning media are needed to overcome the problems experienced by students.

This development's objectives are: 1) Designing and developing Macromedia Flash 8-based learning media for Dimension Three material in high school students in class X. 2) Knowing the

feasibility of Macromedia Flash 8-based mathematics learning media for Dimension Three material in class X high school students.

METHODS

This type of research includes development research. The research was conducted by developing a learning media using the ADDIE development model, namely Analysis, Design, Development, Implementation, and Evaluation. The subjects in this study were grade X students from two different schools in Yogyakarta. The computer application used in making this learning media is the Macromedia Flash 8 application using Three Dimension Material for Class X High Schools.

The steps taken in the product trial process include:

1. Analysis. The analysis phase is carried out to provide an overview of the mathematics learning media with the Macromedia Flash 8 application that will be developed.
2. Design. The design is carried out to design and produce products that are by the development objectives.
3. Development. Media development is the process of creating learning media based on media designs that have been created.
4. Implementation. Based on the responses and input conducted on a limited trial, improvements were made to the learning media before the media was tested in a large class.
5. Evaluation. The final step in the ADDIE learning system design model is evaluation.

Data analysis techniques used in this study are as follows.

1. Qualitative data obtained from the observation sheet are analyzed into qualitative.
2. Data obtained through questionnaires for experts and questionnaires for students in the form of letters are converted into qualitative grades CD
   a. The type of data taken in the form of qualitative data is converted to quantitative with the provisions that can be seen in the following Table 1:

Table 1. Provisions for Scoring

Information	Score
Strongly agree	5
Agree	4
Doubtful	3
Agree on Less	2
Disagree	1

   b. After the data collected can be calculated the average score by the formula:

$$M = \frac{\sum_{i=1}^{n} X_i}{N}$$

Fahmi, Syariful (2016:38)

Information:

M: Average score

$\sum_{i=1}^{n} X_i$: Average number

N: Number of assessors

   c. Change the value of each aspect of the mathematics learning CD to a qualitative value by the criteria of an ideal assessment category with the provisions in Table 2:

Table 2. Criteria for Ideal Rating Categories

No	Score	Criteria
1.	$X_k > \overline{X_i} + 1{,}80SB_i$	Very good
2.	$\overline{X_i} + 0{,}60SB_i < X_k \leq \overline{X_i} + 1{,}80SB_i$	Good
3.	$\overline{X_i} - 0{,}60SB_i < X_k \leq \overline{X_i} + 0{,}60SB_i$	Enough
4.	$\overline{X_i} - 1{,}80SB_i < X_k \leq \overline{X_i} - 0{,}60SB_i$	Less
5.	$X_k \leq \overline{X_i} - 1{,}80SB_i$	Very less

Information:

X_k : Actual / empirical score

$\overline{X_i}$: ideal average

$\overline{X}_i = \frac{1}{2} \times$ (ideal maximum score + ideal minimum score)

SB_i: ideal standard deviation

$SB_i = \frac{1}{6} \times$(ideal maximum score - ideal minimum score)

Ideal maximum score = Σ criterion item x highest score.

Ideal minimum score = Σ criterion item x lowest score

Fahmi, Syariful (2016:38)

d. Determine the overall value of the learning CD by calculating the average score of all aspects and then converted to a qualitative value of learning by the criteria of the ideal assessment category, as outlined in the table above. The results of the ideal criteria category percentage can be seen in the following table:

Table 3. Learning Media Eligibility Criteria

Quantitative Score Range	Qualitative Category	Category
$X_k > 105.01$	Very good	Very decent
$85 < X_k \leq 105.01$	Well	Worthy
$65 < X_k \leq 85$	Enough	Not feasible
$44.99 < X_k \leq 65$	Less	Not feasible
$X_k \leq 44.99$	Very less	Not feasible

Table 4. Eligibility Criteria for Learning Materials

Quantitative Score Range	Qualitative Category	Category
$X_k > 75.60$	Very good	Very decent
$61.20 < X_k \leq 75.60$	Well	Worthy
$46.80 < X_k \leq 61.20$	Enough	Very decent
$32.40 < X_k \leq 46.80$	Less	Very decent
$X_k \leq 32.40$	Very less	Very decent

Table 5. Criteria for Media Feasibility by Student Responses

Quantitative Score Range	Qualitative Category	Category
$X_k > 63$	Very good	Very decent
$51 < X_k \leq 63$	Well	Worthy
$39 < X_k \leq 51$	Enough	Not feasible
$27 < X_k \leq 39$	Less	Not feasible
$X_k \leq 27$	Very less	Not feasible

RESULTS AND DISCUSSION

The data obtained were divided into four parts: research results from media experts, research results from material experts, student responses, and the overall quality of instructional media. The four sections are explained as follows,

1. The quality of instructional media is based on material aspects

Table 6. Results of the Questionnaire Calculation of Material Expertise

Evaluator	Total score	Qualitative Category
Expert Material 1	75	Good
Expert Material 2	64	Good
Expert Material 3	90	Very good
76.33		Very good

Based on table 6, it can be seen that the average score of the material expert assessment of learning media is 76.33. These results indicate that the developed learning media in terms of the material was included in Very Good.

2. The quality of instructional media is based on aspects of the media

Table 7. Results of the Questionnaire Calculation for Media Expertise

Evaluator	Total score	Qualitative Category
Expert Material 1	119	Very good
Expert Material 2	91	Good
Expert Material 3	124	Very good
111.33		Very good

Based on Table 7, it can be seen that the average score of the results of the assessment of media experts on instructional media is 111.33. These results indicate that the developed learning media in terms of the material was included in Very Good.

3. The quality of instructional media is based on student responses.

Table 8. Results of Calculation of Questionnaire Student Response in Limited Trials

School	Mean	Qualitative Category
SMA Muhammadiyah 5 Yogyakarta	66.40	Very good
SMA Muhammadiyah 6 Yogyakarta	64	Very good
Mean	65.20	Very good

Based on Table 8, it can be seen that the average score calculated by students' responses to learning media in the limited trial is 65.20. These results indicate that the learning media developed are included in the category of Very Good.

Table 9. Results of Calculation of Student Response Questionnaire in Large Class Trials

School	Mean	Qualitative Category
SMA Muhammadiyah 5 Yogyakarta	65.03	Very good
SMA Muhammadiyah 6 Yogyakarta	63.94	Very good
Mean	64.49	Very good

Based on Table 9, it can be seen that the average score calculated by students' responses to learning media in large class trials is 64.49. These results indicate that the learning media developed are included in the category of Very Good.

4. Quality of learning media as a whole

Table 10. The Calculation Results for the Joint Questionnaire

Aspect	Average score	Qualitative category	Eligibility category
Material	76.33	Very good	Very decent
Media	111.33	Very good	Very decent
Student response (limited trial)	65.20	Very good	Very decent
Student response (large class trial)	64.49	Very good	Very decent
Total	317.35	Very good	Very decent

The average score of the final assessment obtained for learning media developed is 317.35 of the maximum score of 365 with Very Good quality. So the instructional media is declared Very Eligible as a source of learning mathematics for the Dimension Three material of grade X high school.

CONCLUSION

The results of the research development of learning media can be concluded as follows:

1. Steps in developing learning media with the Macromedia Flash 8 application for the three-dimensional high school grade X material
   a. The analysis was conducted to gather information to develop learning media in SMA Muhammadiyah 5 Yogyakarta and SMA Muhammadiyah 6 Yogyakarta. The analysis results are the maximum use of multimedia space and computer laboratory space in mathematics learning. This is also due to the lack of computer-based learning media in learning mathematics. Material Dimension Three was chosen because students need a clear visualization in the learning process in understanding this material. The development of instructional media is made with the Macromedia Flash 8 application, adjusting the capabilities and needs of learning media development.
   b. Learning media design begins with making a flowchart and storyboard to facilitate making learning media design. The design created is the opening display design, main menu display design, manual display design, SK-KD display design, material display design, video menu display design, sample question display design, question exercise display design, evaluation display design, and profile display design.
   c. Furthermore, selecting lecturers and teachers who are competent in their fields to validate the learning media. Learning media is validated by three media experts and three material experts to get suggestions and input to produce better learning media.
   Revise the learning media based on suggestions and input provided by experts.
2. The feasibility level of learning media developed in supporting the learning of three-dimensional material:
   a. Trials were conducted twice, namely in limited trials and large class trials. A limited trial was conducted on five students of class X SMA Muhammadiyah 5 Yogyakarta and five students of class X SMA Muhammadiyah 6 Yogyakarta by random selection. While the extensive class test was carried out on 30 class X students of SMA Muhammadiyah 5 Yogyakarta and 18 students of class X of SMA Muhammadiyah 6 Yogyakarta.
   b. If viewed from the material aspects, instructional media's feasibility has an average score of 76.33 from an average of 90 ideal scores. It shows that the learning media, in terms of material aspects, are categorized as Very Good.
   c. When viewed from the media aspect, the feasibility of instructional media has an average score of 111.67 from an average of 125 ideal scores, so that it shows that the learning media in terms of media aspects is included in the category of Very Good.
   d. When viewed from students' responses, instructional media's feasibility has an average score of 64.49 from an average of 75 ideal scores. It shows that the learning media, in terms of student
   e. Responses are included in the Very Good category.

REFERENCES

Aqib, Zainal. 2015. *Model-Model, Media, dan Strategi Pembelajaran Konstektual (Inovatif)*. Bandung: Yrama Widya.

Arsyad, Azhar. 2015. *Media Pembelajaran*. Jakarta: Penerbit Raja Grafindo Persada.

Fahmi, Syariful. 2016. *Modul Praktikum Komputer Multimedia*. Yogyakarta: Laboratorium Pendidikan Matematika Fakultas Keguruan dan Ilmu Pendidikan Universitas Ahmad Dahlan.

Pribadi, Benny A. 2014. *Desain dan Pengembangan Program Pelatihan Berbasis Kompetensi: Implementasi Model ADDIE*. Jakarta: Penerbit Prenada Media Group.

Sadiman, Arief S. 2014. *Media Pendidikan: Pengertian, Pengembangan, dan Pemanfaatannya*. Depok: Penerbit Raja Grafindo Persada.

Sundayana, Rostina. 2013. *Media Pembelajaran Matematika*. Bandung: Alfabeta.

Sutopo, Ariesto Hadi. 2003. *Multimedia Interaktif dengan Flash*. Yogyakarta: Penerbit Graha Ilmu.

Suyanto, M. 2003. *Multimedia: Alat untuk Meningkatkan Keunggulan Bersaing*. Yogyakarta: Penerbit Andi.