

DEVELOPING INTERACTIVE MULTIMEDIA FOR LEARNING THREE DIMENSIONS WITH ADOBE FLASH CS4

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Abstract

Interactive Multimedia is any package of materials that includes some combination of texts, graphics, still images, animation, video, and audio. Multimedia technology for instance, has the potential in transforming traditional classrooms into a world of unlimited imaginary environment. This research aims to produce a valid and practical interactive multimedia and have a potential effect on learning outcomes in learning mathematic. The subjects were students of X level at Sekolah Menengah Atas Negeri 1 Cibitung Bekasi. This research was a research development. The multimedia was developed use ADDIE modelling adopted by Munir (2008) through five stages use Adobe Flash CS4, analysis, design, development, implementation, and evaluation. To view its validity had evaluated by experts, to look at its practicalities had used one-on-one evaluation and small groups' evaluation, while to look at its potential effects had used field test. Data collecting method used in this research were in form of questioner that were used to collect the data resulted from the expert's review and students' test. The results showed that most students respond very practice to multimedia, ie 65% and 35% showed a practice response. Moreover, after using the multimedia mostly students achieve excellent learning outcomes, ie 40% and 60% achieve good learning outcomes. Based on the results of expert evaluation, the evaluation of one-on-one, small group evaluation, and field test it can be concluded that the developed interactive multimedia has been valid, practical, and has a potential effect on student learning outcomes.

Keywords: *interactive multimedia, learning mathematics, three dimensions, adobe flash CS4 .*

PREFACE

The development of technology is progressing very rapidly in recent decades. Even technology has become the basic human needs at this time. Its growth affects almost every side of life, so that the very significant influence on lifestyle, education, ways of working and thinking society. In a century-paced advanced as today, the mastery of technology and information is absolutely necessary. Because of the technology, the people of Indonesia can compete face the challenges of globalization. Therefore, the world of education in Indonesia as a nation-generation printer, also must be ready to change, so as to produce the Human Resources better.

Media and technology also affects education. In the present example, the computer has a very strong influence on the learning setting. The tools are high-tech offers the possibility of better teaching

and learning process. The role of teachers and students obviously be changed because of the influence of media and technology. Now teachers and books are no longer the sole source of student learning, however, become the director to use science.

But in reality, in the learning process, teachers still use the lecture method. Whereas the wise teacher is always aware of the conditions relating to the teaching situation it faces, so that teachers can define when the lecture method is used, and when they should use other methods. In the lecture, the teacher as the only source of student learning, so that students are not creative and not given the opportunity to study more about the subjects they are studying. Supposedly, it was students more actively develop the lesson. Teachers only as a companion charge of planning and creating more learning resources thus create a conducive learning environment.

Based on data from 2013/2014 academic year studying in SMA Negeri 1 Cibitung, three-dimensional test results of students in the class X.3 less satisfactory than the exponent that is equal to 42.8% of students who meet the Kriteria Ketuntasan Maksimum (KKM) is lower than the exponent of 44.4%. Most students' difficulties in understanding the three-dimensional concepts, especially the concept of geometry. Students are still experiencing difficulties in seeing and imagining the concept depicted in geometry. This happens suspected of teachers still use conventional methods in the study of mathematics, without any media capable of providing the geometry illustrated with animation and audio. On the explanation above, the need for application of interactive multimedia in mathematics learning in SMA Negeri 1 Cibitung. Multimedia animations geometry can be easier for students to learn concepts and relationships between points, lines, and areas, calculate the distance between points, and others. Expected after studying the three-dimensional use of interactive multimedia, can improve student learning outcomes.

LITERATURE REVIEW

Learning media is one of the solutions to bridge teacher who has been a source of learning of their students. Media as a means of learning or educational tools that can be used as an intermediary in the process of learning to enhance the effectiveness and efficiency in achieving the goal of teaching (AH. Sanaky, 2013: 4). The forms of physical tools in the learning media can stimulate students to learn a lot of variety eg print media, audio-visual or audio. Although media learning are manifold, but the fact that not all types of media can be used by teachers in schools.

One type of media that is capable of displaying visuals with text, pictures, audio, video and animation is interactive multimedia. Multimedia is a series of several types of media in a presentation or a self-learning program. Computers are often used in multimedia presentations that bring together text, audio, and still images or moving (Russell, 2014: 200). In other words multimedia can be expressed as a unity between various media such as text, audio and images. While a multimedia

interactive multimedia is equipped with a controller and can be operated by the user, so the user can choose what you want for the next process (Daryanto, 2010: 52). Application of interactive multimedia in mathematics learning can improve students' interest in learning mathematics (Mila and Rizki, 2015). Besides learning-based interactive multimedia capable mathematics achievement of students (Hery, 2015).

Therefore, the development of the media such as interactive multimedia learning needs to be improved to assist in the learning of mathematics in order to achieve the learning objectives. Interactive multimedia has advantages in terms of interaction, foster interest in learning, and can cultivate an attitude of self-learning. Math is one subject area as the impact of the target current technology, a lot of lessons in mathematics can be applied to interactive media which resulted very important to learn mathematics. Math is one subject that can be touched by the interactive media because mathematics is an inexact science in which there are lessons that can be applied in interactive media.

Interactive multimedia development is expected that students are able to make a mathematical concepts become real with static and dynamic visualization, which in turn can increase student motivation. Because motivation and learning outcomes are the two things that affect the quality of learning. Motivation will make a good learning good learning outcomes anyway. When teachers use different teaching methods, students are expected to learn so that the spirit of motivation and learning outcomes increases.

The application program (software) that is good enough to make the animation is Adobe Flash CS4 with ActionScript 3.0 as the programming language. Adobe Flash CS4 is the software that was used to create vector images and animations. Advantages of Adobe System's flagship product can transform 3-D images and animations perfectly.

One lesson that can be applied in the field of interactive multimedia is a three dimensional geometry. Basically, three-dimensional have a greater opportunity to understand the students compared with other branches of mathematics. Nevertheless, the evidence on the ground shows that the three-dimensional learning outcomes are still low and needs to be improved. The use of interactive media Adobe Flash CS4 is suitable for use in a three-dimensional, because the three-dimensional geometry are matched used in multimedia animation.

RESEARCH METHODS

The research method is a research & development, which aims to produce interactive multimedia for mathematics learning valid criteria, practical and effective. The development model used in this study is the ADDIE development model because, according to Lee and Owens (2004) in Rojali (2013) shows the development model and clear steps carefully to produce the product and the model is

designed specifically for multimedia learning. ADDIE development model includes five phases, namely: Analysis, Design, Development, Implementation and Evaluation.

ADDIE model development combined with Formative Evaluation of Tessmer. Stage analysis; done before developing learning media. Analysis is conducted analysis of literature and learning media. Stage design; Researchers preparation interactive multimedia development, namely, prepare materials and make design product design product design. Stage of development; Researchers made the initial product using software and materials that have been prepared beforehand in which the product in the form of interactive multimedia. Stage implementation; researchers to deliver products that are developed in a three-dimensional learning. Product delivery is done in the classroom. Stage evaluation; evaluation to test the validity, practicalities and effectiveness of the media, to see the validity of validated media carried out by the experts while to look at the practicalities and effectiveness of interactive multimedia performed at the stage of product testing. At this stage, the evaluation was conducted based on the evaluation of Tessmer namely self evaluation, expert review, one-to-one evaluation, small group evaluation and field test evaluation.

Data collection techniques in this study, which uses the expert test, questionnaire and test learning outcomes. Test experts include validation process conducted by three experts, ie, materials experts, pedagogical experts, and media experts. Questionnaires given to the students to determine the practicality of interactive multimedia which has been developed with a view student responses on the questionnaire contains interactive multimedia which 14 descriptors. The test is used to assess the effectiveness of interactive multimedia has been developed which is measured during the field evaluation. Interactive multimedia is said to be effective if the learning outcomes of students achieving $\geq 75\%$ KKM. Data analysis is done, the validity of data analysis techniques, questionnaire data analysis techniques and engineering test data analysis. Based on the ratings obtained from experts to fill out a validation will be concluded that interactive multimedia is said to be valid if the score validation of content and pedagogic reaches the percentage score of $\geq 41\%$ and if the score reaches media validation ≥ 13 . It is classified as in Table 1 and Table 2 below.

Table 1. Percentage Score Category Validation of Content and Pedagogy

Percentage Score	Interactive Multimedia Quality
81% – 100%	Very Good
61% - 79%	Good
41% - 60%	Pretty Good (Medium)
21% - 40%	Poor (Low Quality)
0% - 20%	Not Good

Table 2. Score Category Validation of Media

Percentage Score	Interactive Multimedia Quality
21 – 25	Very Good
17 - 20	Good
13 - 16	Pretty Good (Medium)
9 - 12	Poor (Low Quality)
5 - 8	Not Good

(Modified Djaali dan Muljono, 2008:139)

The formula used to calculate the score of the questionnaire as follows.

$$K = n \times A$$

$$\text{Total Score} = \Sigma K$$

$$\text{Percentage Score} = (\Sigma K / T) \times 100\%$$

Explanation:

T = Maximum Total [$\Sigma(n \times \text{Maximum answer scores})$]

K = Skor of each item

n = Jumlah responden yang menjawab

A = Answer scores (modified Riduwan, 2009:89)

Percentage score obtained is then presented to the criteria of interpretation score questionnaire as in Table 3 below.

Table 3. Criteria of Score Questionnaire interpretation

Score Questionnaire	Interpretation
81% – 100%	Very Practical
61% - 79%	Practical
41% - 60%	Reasonably Practical
21% - 40%	Impractical
0% - 20%	Very Impractical

Based on Table 3, multimedia learning can be said to be practical if the interpretation of the value of the questionnaire reached $\geq 41\%$. Each student in the category as excellent when obtaining learning outcomes exceeded the KKM and the average grade, and is categorized as good if obtaining learning outcomes exceeded the KKM but below the average grade.

RESULTS AND DISCUSSION

Analysis

At this stage, an analysis of the learning outcomes of three dimensional lesson using conventional learning models conducted by the teacher. Data obtained based on test results of three students in the class dimension X.3 unsatisfactory that only 42.8% of students who meet the criteria ketuntasan maksimum (KKM). Therefore, development of learning media needed to visualize the lesson of three-dimensional in the form of unit consisting of text, audio, animation and graphics are interactive multimedia. Thus increasing the interest in mathematics learning that will affect the learning outcome.

Design

Design interactive multimedia that will be developed tailored to the character of the class X, with the view that simple. As for the display of multimedia interactive, namely, SK, KD and indicators of learning of three dimensionals lesson adopted from the syllabus that has been provided by the school, the lesson of the three dimensional, a collection of animated form of dots and lines connected to form a wake-up space, exercises and tests

Development

Interactive multimedia software developed using Adobe Flash CS4 help with animation in dreamweaver support. Interactive multimedia development through an evaluation period as well as input and suggestions from peers and experts and media materials.

Evaluation Review

The evaluation of the interactive multimedia that is developed through phases of product validation by experts of content and pedagogic, the replenishment assessment sheet consisting of 20 item indicators. Retrieved percentage of the total score based on expert of content validation is 85%, which means that the entry in the excellent category. While based on the expert of pedagogic validation obtained percentage of total score 79%, which means entering into good category. The result of the acquisition of interactive multimedia validation by experts of content and pedagogic can be seen in Table 4 below.

Table 4. Analysis of the validity of Interactive Multimedia Content and Pedagogic

No	Indicator	Score	
		Content	Pedagogic
I. Components of the feasibility of contents			
A. Coverage of Lesson			
1	The depth of lesson in media learning	4	5
B. Content of Cognition			
2	The lessons are designed and modified as a complete so it is easier to understand learners	4	4
3	Examples and illustrations of existing support dimension three lesson	5	5
4	The lesson presented in accordance with the development of mathematics (Actual)	4	3
5	Provide training for students to self-assessment	4	4
6	Exercises are available to measure the level of mastery of the subject of a three-dimensional	4	3
C. Linkage Basic Competence / Curriculum			
7	The relevance of the learning objectives of competency standards / curriculum	5	4
8	The suitability of the lesson with the basic competencies / curriculum	4	4
9	Consistency and evaluation exercises with the basic competencies / curriculum	4	4
D. Accuracy Lesson (correctness and accuracy)			
10	Truth and accuracy of concept	4	4
11	Truth and accuracy of theory	5	4
I. Presentation Components			
A. Presentation of Learning			
12	Encouraging students to know the contents of Learning media	4	4
13	Stimulate and involve the participation of students to learn	5	4
14	Presentation is communicative and interactive	5	4
15	Systematic / trace / groove	3	3
16	The image is clear and easily understood	5	4
B. Communicative and Interactive			
17	Ease to learn	4	4
18	Interactivity	4	4
C. Aspects of Language			
19	The language used is easy to understand for students and raw	4	4
20	No cause ambiguity	4	4

Validation of interactive multimedia based media expert, measured through 5 assessment indicators. Results obtained are 18 of 25 maximum value. So that interactive multimedia is considered good. The results of the validity of media experts can be seen in Table 5 below.

Table. 5. Analysis of the validity of Interactive Multimedia Media

No	Assesment Indicators	Score
1	How is the clarity of the instructions for use of the interactive multimedia?	3
2	How is the quality of the interactive multimedia display?	4
3	What is the composition of the multimedia color?	4
4	What level of interactivity multimedia?	3
5	How is the clarity of feedback (interactivity) multimedia in three-dimensional lessons	4

Based on the results of the validity of the construct, pedagogical and media can be concluded that the developed interactive multimedia declared valid.

One to One Evaluation and Small Group Evaluation

In the test one to one evaluation, there are three students who become the object of this study, while small group evaluation tested on 10 students of class XI at SMA Negeri 1 Cibitung Bekasi. Students are selected in one to one and small group evaluation is given an explanation of the function of interactive multimedia and lessons that is in use. After that the students are welcome to try interactive multimedia introduced. Furthermore, students were given a questionnaire to fill out, the questionnaire consists of 12 items developed ratings of 3 aspects of learning, content and media. The average value of the three aspects of the questionnaire for one to one evaluation obtained 79.3%, so it categorized as practical. While the average value obtained from the questionnaire evaluation of a small group that is 81.1%, categorized as very practical. The test results can be seen in Table 6 below.

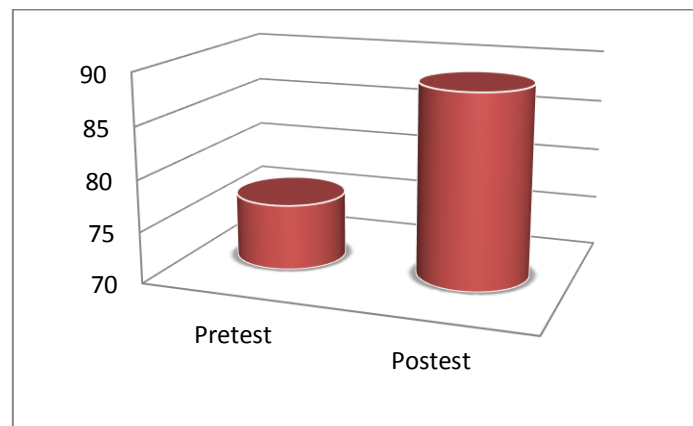
Table. 6. Result One to One Evaluation

No	Aspect	Score questionnaire	
		One to One Evaluation	Small Group Evaluation
1	Learning	78,3 %	81,1
2	Construct	80,0 %	81,7
3	Media	79,6 %	80,5
Mean		79,3 %	81,1

The results of the interview to the three students test one to one evaluation, two of the students stated "exercises less varied," and one other student said that "interactive multimedia is very interesting and hope can be applied to all the material math so that students who have an interest less against mathematics became interested".

Field Test Evaluation

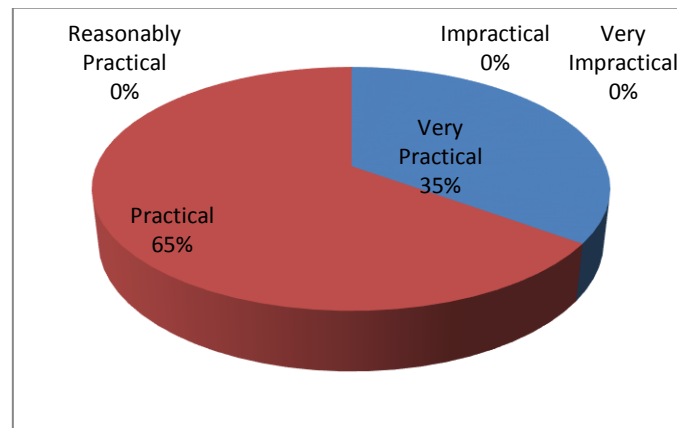
Based on the interview of the three students, the interactive multimedia revised by adding the exercises. After the revised media and than field test to 36 students of class X Sekolah Menengah Atas Negeri 1 Cibitung Bekasi. Media used 3 times meeting in the classroom. The results obtained from the study of two conditions before and after the use of interactive multimedia. Comparison of learning outcomes before and after the use of interactive multimedia can be determined based on the average value of the class shown in the bar chart below.



Picture 1. Comparison Values pretest and posttest

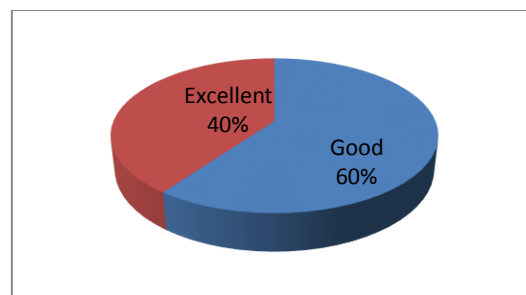
Field Test Evaluation

Based on the graph comparison of pretest and posttest in the field test evaluation can be seen an increase by 12.19% of student learning outcomes before and after using interactive multimedia. While the students' response to interactive multimedia can be seen in Figure 2 below.



Picture 2. Result of Small Group Evaluation

It is clearly seen in Figure 1 that out of 36 students as much as 65% consider that the interactive multimedia developed for three-dimensional material is very practical, while the remaining 35% of students stated practical. Acquisition of student learning outcomes after using interactive multimedia categorized into two parts good and excellent. As many as 40% of students categorized as excellent, while the remaining 60% of students categorized as good, as shown in Figure 3 below.



**Picture 3. Learning Outcomes After Using
Interactive Multimedia**

CONCLUSION

This study is a research development research. Product development is done through five stages: analysis, design, development, implementation, and evaluation. For evaluation three stages one to one evaluation, small group evaluation and field test evaluation.

The results showed that the development of interactive multimedia the lesson of three-dimensional at SMA Negeri 1 Cibitung Bekasi, declared valid, practical and able to improve student learning outcomes. Improving student learning outcomes identified through a comparison between student learning outcomes before and after using interactive multimedia. In addition to the students' response to the use of interactive multimedia considered good, and learning outcomes obtained categorized as good as much as 60% and as much as 40% excellent.

REFERENCES

- AH Sanaky, H. (2013). *Media Pembelajaran Interaktif-Inovatif*. Yogyakarta: Kaukaban Dipantara.
- Daryanto. 2015. *Media Pembelajaran*. Yogyakarta : Gava Media
- Hery Theresia Maria. 2015. Upaya meningkatkan minat dan prestasi belajar matematika siswa dengan mengggguakan penerapan pembelajaran berbasis multimedia interaktif. *Jurnal ilmiah edukasi matematika (JIEM)*. Vol 1/no.1/april 2015. ISSN. 977-2442-8780-11
- Muljono, D. d. 2008. *Pengukuran dalam Bidang Pendidikan*. Jakarta: Grasindo.
- Munir. 2012. *Multimedia Konsep dan Aplikasi dalam Pendidikan*. Bandung: Alfabeta.
- Paseleng C Mila dan Arfiyani Rizki. 2015. Pengimplementasian media pembelajaran berbasis multimedia interaktif pada mata pelajaran matematika di Sekolah Dasar. *Jurnal Scholaria*, vol 5. No.2 mei 2015 :131-149
- Puji Marisa Puji, dkk. 2014. Pengembangan Multimedia Interaktif untuk Pembelajaran Bentuk Molekul di SMA. *J. Pen. Pend. Kim*, 1(1), 59-65
- Riduwan. 2009. *Belajar Mudah Penelitian untuk Guru - Karyawan dan Peneliti Pemula*. Bandung: Alfabeta.