**Development of Mathematics Learning Media with Macromedia Flash**

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***Abstract***

*This study aims to develop the application program macromedia flash as a mathematics learning on the comparison material. The development procedure used is Borg and Gall procedure which has been modified by Sugiyono. The procedure used is limited to only 7 steps from 10 steps of potential and problems, collecting imformation, product design, design validation, design improvement, field trials and product revisions. This research and development resulted in a learning media on mathematics learning which is valid and feasible to be used as a medium of learning by 3 material experts who scored an average of 3.67 and 2 media experts who scored an average of 3.59 with each the maximum score of the validity is 4. While the attractiveness test of instructional media stated "Very Interesting" by 10 students of class VII small group test selected from 5 classes heterogeneously with average score 3,4 and 30 students of class VII b large group test with score the average of 3.8 of each maximal attractiveness score is 4. So as a whole the research and development is declared feasible and can be used as a medium of learning mathematics.*

*Keywords : Macromedia flash; math cool; modern learning.*

**Abstrak**

Penelitian ini bertujuan untuk mengembangkan program aplikasi *macromedia flash* sebagai media pembelajaran matematika pada materi perbandingan. Penelitian dan pengembangan ini dilakukan karena minimnya penggunaan media pembelajaran yang digunakan oleh pendidik dalam pembelajaran terlebih lagi pada pembelajaran matematika. Prosedur pengembangan yang digunakan adalah prosedur *Borg and Gall* yang sudah dimodifikasi oleh Sugiyono. Prosedur yang digunakan dibatasi hanya 7 langkah dari 10 langkah yaitu potensi dan masalah, mengumpulkan imformasi, desain produk, validasi desain, perbaikan desain, uji coba lapangan dan revisi produk. Penelitian dan pengembangan ini menghasilkan sebuah media pembelajaran matematika pada pokok bahasan perbandingan yang telah dinyatakan valid dan layak digunakan secara keseluruhan sebagai media pembelajaran oleh 3 Ahli materi yang memperoleh skor rata-rata 3,67 dan 2 Ahli media yang memperoleh skor rata-rata 3,59 dengan masing-masing skor maksimal kevalidan adalah 4. Sedangkan uji kemenarikan media pembelajaran dinyatakan “Sangat Menarik” oleh 10 peserta kelas VII uji kelompok kecil yang dipilih dari 5 kelas secara *heterogen* berdasarkan tingkat kecerdasan dan jenis kelamin siswa yan memperoleh skor rata-rata 3,4 dan 30 peserta didik kelas VII b uji kelompok besar dengan skor rata-rata 3,8 dari masing-masing skor maksimal kemenarikan adalah 4. Sehingga secara keseluruhan penelitian dan pengembagan ini dinyatakan layak dan dapat digunakan sebagai media pembelajaran matematika.

**Kata kunci** : *Macromedia flash;* matematika asik; pembelajaran modern**.**

**PRELIMINARY**

 Education is a complex, broad-dimensional activity, and many of the variables that influence it. A psychological process, education can not be from the teaching-learning process, from a teaching perspective, the perpetrator is a teacher / educator, or an educating party (Syazali, 2015). Without education at all human barriers can live and grow in line with aspirations (ideals) to move forward, prosper and happy. Through human education can be mutual understanding and gain knowledge. In the process of learning the teacher provides science as a stock of students in solving problems in life.

Artinya : *So the Most High God is the true king, and do not rush to read the Qur'an before it is perfected to reveal to you, and Say: "My Lord, add me knowledge."*

 In the Qur'an it has been explained that science is important. And mathematics is a very important science to learn, Because it can be said, Mathematics is the mother of all knowledge. Almost all subjects like Physics, Chemistry, Accounting, etc. use Mathematical calculations. In the world of technology and everyday life, we often deal with numerical calculations. Almost everything in the world uses the science of Mathematics. To realize a good Mathematics education, a lot of problems to be solved. Like problems in the process of teaching and learning activities in the classroom. Most teachers still use conventional methods that are less varied, causing the teaching and learning process Math seems monotonous and less creative so that students are less able to absorb the material being taught.

 Teaching and learning process Math is monotonous and less creative, sometimes makes students feel bored and tired. So that causes many students who are sleepy when taught, not concentrated, crowded themselves, etc. which resulted in the material taught can not be absorbed well by students. For that we need a method and instructional media that match and appropriate target for each class according to condition of student. Here the role of the teacher is very. important, because the teacher as a class coordinator that regulate the process of teaching and learning activities. A teacher should be able to choose methods and learning media that are suitable for each condition of the students.

 From the data generated, in SMP Muhammadiyah 3 Bandar Lampung learning is still driven by conventional methods of lecture methods, work problems and assignments. Evident from the results of observation of the lack of use of learning media in the learning process moreover with mathematics learning, so students assume mathematics learning in addition to the learning demanded by the shipment of mathematics learning formulas is the learning that makes saturated and boring. In addition, the ingenuity of a teacher in relating learning with everyday life will be able to embellish the students' thinking in understanding the material.

 Different levels of student understanding require teachers or educators to be more creative in delivering the material. Teachers can use instructional media at school for learning purposes. Through the learning media is expected to become more creative and innovative teachers in providing learning to students. Learning media used as a means of teaching and learning in schools aims to improve the quality of education. Media is a tool that can be used as an intermediary that is useful to improve the effectiveness and efficiency in achieving goals Based on that opinion, the use of media in learning provides benefits for teachers and for students. Teachers have adequate and representative means. In contrast to students, the use of media can make students cope with boredom and kejenuhun when receiving lessons (Arsyad, 2013). Learning media can be a good repon for learners (Sari, Farida, & Putra, 2017). In addition, learning media have a very important function in teaching and learning process to improve the quality of education (Sari, Farida, & Syazali, 2016).

Along with the rapid development of science, technology and the rapid flow of globalization at this time, a lot of computer applications are launched such as Geogebra, Microsoft Powerpoint, Mathemathica 7, Adobe Flash, Macromedia Flash, etc. that should have been utilized by educators in Indonesia to develop as a teaching material, especially in learning mathematics, Conventional method is considered no longer relevant to use. Limitations of educators in developing applications that have been launched should not be an excuse, nothing is impossible with learning. Technology comes with a demand to improve the ability in mastering learning technology through the task of making computer-based media (Andayani, 2017)

 The description of the problems above shows that the need to be designed and developed an interesting learning media by utilizing the technology that has been provided nowadays to improve the quality of education of course. In addition, to minimize student assumptions that the lessons are boring. Based on the above description the authors develop a macromedia flash based learning media in mathematics learning is expected with the development of this one way to improve the quality of education as well as an alternative teaching materials in learning mathematics that can reduce students' assumption that the lessons are boring.

 Research by developing the previous macromedia flash application has also been done by some researchers who stated could be as one of the tools in learning mathematics to overcome the saturation of students in the class, but there are some differences will be done in this research (Fahmi, 2014). The difference in research and development is on the subject discussed in the media, besides this research is not all emphasized on the media, this research also emphasized on the contextual approach. In addition to the differences with the above research is also obtained with other research, the difference is that research and development is done only move the material into the media accompanied by the buttons that serve to connect the desired slide by the user visible in the display of learning media results. Some differences will be made in the research and development here among other than the subject and the transfer of material into the media, this development is given several animations, in addition to this development will be given simulations related to daily life which is expected to stimulate student thinking to understand the problems that exist in mathematics (Sinurat, Edi, & W., 2015). While found in other research by developing the same application in learning mathematics by making use of animations as reference of student's memory in gometri material (Ruwaida, 2012), while in writer's research, animation functioned as stimulus of student's motivation to study material the.

**METODE PENELITIAN**

*Types of research*

This type of research is research and development (R & D).

*Time and place of study*

This research was conducted at SMP Muhammadiyah 3 Bandar Lampung on 23 October 2017.

*Research subject*

This product test was conducted on 10 small-scale students selected heterogeneously based on students' intelligence and gender levels and 30 large-scale students taken in 1 class.

*Research procedure*

This research and development use method from Borg and Gall. (Sugiyono, 2010, p. 297) explains there are 10 steps from the method of Borg and Gall. Due to the limitations of researchers in this study both in terms of time, ability and in terms of cost of this research is limited to only 7 stages:

1. Potentials and problems

2. Collect the information

3. Product design

4. Design validation

5. Product improvements

6. Field trials

7. Product revisions

*Data collection and analysis techniques*

In the data collection, there are 2 techniques used by the researchers are interviews and questionnaire Likert scale with 4 answers. The scoring used in the expert validation assessment can be seen in Table 1.

**Table 1. Expert Validation Score Score**

**modified**

|  |  |
| --- | --- |
| **Skor** | **Eligibility Option Choice** |
| 4321 | Strongly agreeAgreeLess AgreeDisagree |

While the scoring of product attractiveness test can be seen in table 2.

**Table 2. Score of Trial Assessment**

(Candra, 2014) **is modified**

|  |  |
| --- | --- |
| **Score**  | **Choice of Response Options** |
| 4321 | Very interestinginterestingLess attractiveVery Less Interesting |

The total scoring score in the data analysis can be searched by the following formula :

$$\overbar{x}=\frac{\sum\_{i=1}^{n}x\_{i}}{n}$$

With

$$x\_{i}=\frac{Total score}{Skor maks} x 4$$

Imformation :

$\overbar{x}$ = the final average

$x\_{i} $= test value of each student's questionnaire

$n$ = number of students who completed the questionnaire.

In the conversion of the feasibility score and the attractiveness of the product, the following guidelines are used :

**Converting the Product Worthiness Score**

|  |  |
| --- | --- |
| **Quality Score** | **Eligibility Criteria** |
| $$3,26<\overbar{x}\leq 4,00$$$$2,51<\overbar{x}\leq 3,26$$$$1,76<\overbar{x}\leq 2,51$$$$1,00<\overbar{x}\leq 1,76$$ | ValidValid EnoughLess ValidInvalid |

***Tabel 3.* Expert Validation Criteria**

(Candra, 2014)**is modified**

**Conversion of product trial scores**

***Tabel 4. Kriteria untuk Uji Kemenarikan***

**(Novitasari, 2014) *dimodifikasi dar tabel 3***

|  |  |
| --- | --- |
| **Quality Score** | **Quality Questions of Aspect of Attraction** |
| $$3,26<\overbar{x}\leq 4,00$$$$2,51<\overbar{x}\leq 3,26$$$$1,76<\overbar{x}\leq 2,51$$$$1,00<\overbar{x}\leq 1,76$$ | **Very interesting****Interesting Less****attractive Very Less****Interesting** |

**RESEARCH RESULT AND DISCUSSION.**

The result of this research and development is a learning media based on macromedia flash in learning mathematics. Stages used in this research and development using Borg and Gall procedures 7 stages of 10 stages. Stages of that stage include:

*Potentials and problems*

In this stage the problem found the minimal use of learning media in learning mathematics in SMP Muhammadiyah 3 Bandar Lampung. So the researchers tried to inflate a flash-based learning media

*Collect Imformation*

At this stage the researchers conducted several literature studies from several literature books and several journals that support, and obtained the product to be developed in the form of development of learning media based on macromedia flash in mathematics learning on the subject of comparison.

*Product Design*

After the needs analysis, then the next stage of media creation. Media created using Macromedia Flash 8 application program with the help of other application programs such as Photoshop, Ms. Power point, etc.

*Design Validation*

After the product design is completed, then the assessment is done by material experts and media experts. From each assessment given by the expert validator, the developed learning media is declared valid and feasible to be used as a learning media after the revision. For validation results as follows

**Table 5 Validation results by material experts**

|  |  |  |
| --- | --- | --- |
| *Total Score* | *Criteria* | *Imformation* |
| 3,59 | Valid | No Revition |

**Table 6 Validation results by media experts**

|  |  |  |
| --- | --- | --- |
| *Total Score*  | *Criteria* | *Imformation* |
| 3,67 | Valid | No Revition |

*Improved design*

 The feasibility and validity of products is inseparable from inputs and suggestions by experts. The improvements made to the developed product are guided by the inputs and suggestions obtained from the validation experts.

*Field trials*

 The product trial was conducted in 2 stages: small group trial consisting of 10 class VIII respondents and field trials consisting of 30 respondents. At the small group testing stage the results of the test obtained as in Table 7 below:

**Table 7 small-scale test results**

|  |  |  |  |
| --- | --- | --- | --- |
| Resp. | Jumlah Skor | Skor kelayakan | Kriteria |
| *1* | 46 | 3,53 | SM |
| *2* | 43 | 3,30 | SM |
| *3* | 39 | 3 | M |
| *4* | 44 | 3,38 | SM |
| *5* | 47 | 3,61 | SM |
| *6* | 49 | 3,76 | SM |
| *7* | 45 | 3,46 | SM |
| *8* | 44 | 3,38 | SM |
| *9* | 47 | 3,61 | SM |
| *10* | 43 | 3,30 | SM |
| *jumlah* |  689 | 34,33 | $$\overbar{x}=3,43$$ |

**Table 8 large-scale test results**

|  |  |  |  |
| --- | --- | --- | --- |
| ***Resp.*** | ***Jumlah******Skor*** | ***Skor Kelayakan*** | ***Kategori*** |
| *1* | 45 | 3,46 | SM |
| *2* | 43 | 3,30 | SM |
| *3* | 47 | 3,61 | SM |
| *4* | 44 | 3,38 | SM |
| *5* | 45 | 3,46 | SM |
| *6* | 44 | 3,38 | SM |
| *7* | 49 | 3,76 | SM |
| *8* | 43 | 3,30 | SM |
| *9* | 40 | 3,07 | M |
| *10* | 47 | 3,61 | SM |
| *11* | 47 | 3,46 | SM |
| *12* | 43 | 3,30 | SM |
| *13* | 48 | 3,69 | SM |
| *14* | 47 | 3,61 | SM |
| *15* | 45 | 3,61 | SM |
| *16* | 47 | 3,69 | SM |
| *17* | 44 | 3,38 | SM |
| *18* | 43 | 3,30 | SM |
| *19* | 44 | 3,38 | SM |
| *20* | 46 | 3,53 | SM |
| *21* | 48 | 3,61 | SM |
| *22* | 45 | 3,46 | SM |
| *23* | 46 | 3,53 | SM |
| *24* | 44 | 3,38 | SM |
| *25* | 43 | 3,30 | SM |
| *26* | 49 | 3,76 | SM |
| *27* | 44 | 3,38 | SM |
| *28* | 41 | 3,15 | M |
| *29* | 45 | 3,46 | SM |
| *30* | 43 | 3,30 | SM |
| **jumlah** | **2.182** | **114,21** | $$\overbar{x}=3,807$$ |

Information ; SM (Very Interesting); M (Interesting); CM (Cukukp Interesting); TM (Not Attractive). From the test data shown in tables 7 and 8, the product attractiveness level in small group trials obtained an average score of 3.43 with the criteria "Very Interesting" and large group trials achieved an average score of 3,807 with the criteria "Very Interesting" . In this case the researcher concludes that there is its own attractiveness of learning with the help of learning media in the classroom.

*Product revision*

 At this stage the product revision is done what if there are obstacles found when the product is tested and the attractiveness of the product states the product with unattractive criteria. In the experiments conducted by the researchers obtained the results of the test with the criteria "very interesting" and there are no constraints of use found so that the product does not need to be revised again.

**CONCLUDE**

The conclusions obtained from this research are:

1. The quality of media obtained from some expert judgments, ie material and media experts obtained the result that the media is very feasible to use. Media feasibility obtained from the experts are: (a) material experts ie on the aspect of material feasibility obtained an average of 3.73, the language aspect obtained an average of 3.64, and on the evaluation feasibility aspect obtained an average of 3.66 ; (b) Expert media that is on aspect of media efficiency obtained average 3,87, aspect of function of button obtained average 3.5 and Graphic aspect obtained average score 3,4.
2. Student response to the development of macromedia flash based learning media is from 2 times small group test and large group that is "Very Interesting" with the average score of 3.61.

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