Validation and Development of Magnetic Field Interactive Multimedia Using Adobe Flash as Physics Learning Media

Ririn Sabani
M. Rahmad, M. Nor

Faculty of Teacher Training and Education, University of Riau
ririnsabani@gmail.com

ABSTRACT

This research aimed to design and build interactive multimedia on the magnetic field's topic using Adobe Flash as a physics learning media in Senior High School. The type of product is a validation of multimedia interactive. This research is an R&D research using ADDIE models. The data needed for this research are the validation assessment score given by the validatorswho are using evaluation sheets with descriptive analysis techniques. Validator consists of 4 experts as an expert construct and 3 experts as an expert user who given the score of the aspectthat is design, pedagogy, learning content, and users. The final results of the validation assessment of expert constructs are 3.49 with categorized as very high and the result of expert users are 3.59 with categorized as very high. The interactive multimedia had been declared valid and eligible for use in the process of learning and teaching in school.

Keywords:Adobe Flash, Interactive Multimedia, Magnetic Field, Validation

Introduction

Physics Learning is learning can develop the perceptibility of an analysis, to understand, starting with the understanding the basic concept (Yeni Agusti, 2013).

Gunawan (2008) in his research found that there is a linear correlation between the generic science skills with the mastery of the concept of physics. In this research found that students with high science generic skills have a high understanding/mastery of physics concepts as well. Furthermore, Wiyono (2009) found that the use of interactive multimedia can improve generic science skills, and can improve student learning attitudes (Syamsudin, 2008). With flash animation, students will get a real picture so that the process of receiving students will be more meaningful. Animation media also useful to fight the boredom of students in learning so that students remain active in following the learning process. The media will greatly assist the learning process of students in understanding the concepts of the lesson and to help students in learning, the media can also be used as a tool to increase the attractiveness of the learning process, because with the media are encouraged students will follow his desire in the process learning so that learning is no longer boring and more recalled in the minds of the students (Yudhi Munadi, 2008).

The learning media includes all sources of required to do communication with students. This can be software that contains messages or educational information, while hardware is a means to display messages contained in the

media. A software that can be used to create learning media is Adobe Flash software. This software is chosen because it has many supporting features. With these advantages, is expected to be realized an attractive and attractive visual media application visually for students.

Adobe Flash as a software for the interactive media learning based on some of the more it. Flash not only combines multimedia elements with Action Script, flash also has the ability to create interactive scripting. Adobe Flash has advantages over other programs, Adobe Flash can be used easily and freely in creating animations with free movement in accordance with the desired animation. Adobe Flash produces small files, capable of generating FLA type files (extensions) are flexible, because it can be converted into files of type *swf, HTML, jpg, png, exe, mov* (Ariesto, 2003).

The curriculum of 2013 integrates the subject into the form of ICT interactive multimedia (Fatima, 2014). Good and quality learning media should consider several aspects, 1) Validation, 2) Practical, 3) Efficiency, 4) Security, and 5) Aesthetics. In choosing a good media and quality must be a media that has been validated by some experts who have been tested, where the media are made able to convey the concept that is taught.

Methodology

This research was conducted at Physics Education Development Laboratory of Physical Education Department of PMIPA FKIP UR and started from December 2015 until May 2016. The research method used is R&D and use the model design of ADDIE type.

The ADDIE model begins with an analysis of teachers, students, and curriculum. Analyze

the difficulty of teachers and students in teaching and learning on physics that can use into interactive multimedia.

After that, begin to design and create the interactive multimedia design based on the problems that have been analyzed. Then evaluated, whether the design has been designed in accordance with the analysis of the problem. If not appropriate, seen anything not good in the design. Fix the less suitable parts, then proceed to the next stage. After the planning process, program development is continued with storyboard. After media development, the media is evaluated in accordance with the design that has been designed Implementation is the testing and evaluation stage of the media. The results of this testing process will be used in the adjustment process to achieve the desired system quality. At the evaluation stage, it is done at all stages of the ADDIE model. If the implementation stage is in accordance with the expected, then the media developed can be tested feasibility (tested the validity of content and construct validity). In general, this multimedia design plan such as Picture 1.
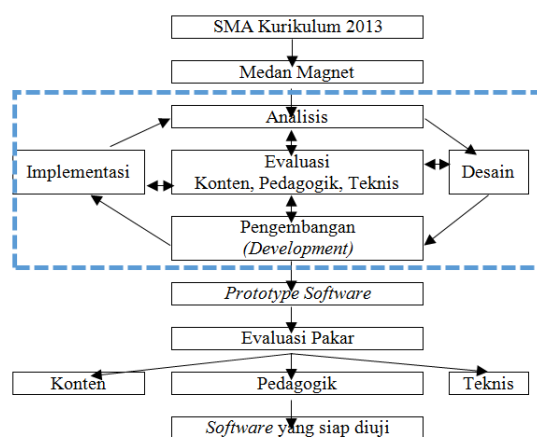
Picture 1. Design model of ADDIE on multimedia (Muhammad Nasir, 2014)

This research produces an interactive multimedia at physics magnetic field concept using Adobe Flash. The data required in this study is validation assessment score provided

by the validator to the development of multimedia learning. The research instrument used to collect the data in this study is a sheet of multimedia validation as the information retrieval, input, and response to the multimedia based on predetermined test criteria. Aspects assessed at the validation stage, adapted from the criteria of the development of instructional media written by Muhammad Nasir (2014). In terms of media, the aspects considered are: design aspect, pedagogic aspect, content aspect, and user aspect.

Data collection techniques in this research are done by testing and evaluating multimedia to several validators. Result, the data of content validity and construct validity. Validator in this research are lecturers of Physics Education Study Program which is expert in multimedia and lesson (expert construct) which amounts to 4 experts and SHS teachers in Pekanbaru which is 3 experts (expert user). The data as much as 2 times validation, the first validation is done by giving validation sheet to the validator, then validator givessuggestions for improvement of multimedia. The second validation is done by giving the assessment sheet to the validator. The validator will provide an assessment of interactive multimedia in accordance with indicators or aspects that have been determined on the assessment instrument.

This media that use Adobe Flash as physics learning media in Senior High School is valid if it has the average score of media assessment on high or very the high category. However, it is not valid if the category of media valuation is low and very low.

Result and Discussion

An interactive multimedia program on magnetic field lessons using Adobe Flash is a media used to learn about magnetic fields.

After designing, then the next step isto develop the design into a learning media that is valid, practical, and effective. The interactive multimedia design using Adobe Flash through the design procedure of ADDIE model.

Phase Analysis (Analysis)

The first stage, an analysis of the lesson will be made in interactive multimedia learning. After analyzing, the magnetic field selected as lesson made into the learning media. The results of this analysis are then evaluated by experts, whether this lesson in accordance with the criteria required for the manufacture of this multimedia.

Phase Design (Design)

The design of multimedia is made in 3 meetings, which in each meeting according to the indicator of curriculum and written in multimedia. In multimedia, there is also lesson equipped with animation, where this lesson has been made in such a way that can build concepts that can facilitate students to understand the subject. There are also examples of questions and exercises for each meeting and evaluation at the end of the lesson.

The designed multimedia consists of 3 meetings, so there are 3 competencies, 3 lessons and 3 exercises. At first meeting, there is a magnetic field lesson, a magnetic force line, a factor affecting the magnetic field, and the direction of the magnetic field around the wire. At the second meeting, it consists of a magnetic field around a straight wire, a circular wire, a solenoid, and a toroid. At the third meeting, will study the Lorentz force, the Lorentz force of the electrically conductive conductor in the magnetic field, the Lorentz force on the moving charge which is in the

magnetic field, the radius of the trajectory of charged particles located in the magnetic field, the Lorentz force between two straight parallel carriers and flowing, and Lorentz style apps. The designed results are evaluated before proceeding to the development stage.

Development Phase

The evaluated design has been developed to become an interactive multimedia product.In this main display, there is some menu to start learning. This learning media uses mixed navigation. In the main menu of the user can freely choose the desired menu option. Whether you want to get into learning lessons, see competence, or evaluate. When selecting the lesson menu it will go into the lesson view. The learning media gives the user the choice whether to enter the meeting from scratch or directly into the desired lesson.

The navigation used at each meeting is linear navigation. Where users will press the next and previous buttons start from beginning to end. Users can not jump directly to the desired view. Users must pass through the phases to complete each lesson. The lesson in each meeting is given the option to be accompanied by music or not. And also there is a narrative that is expected to make students able to understand the lesson better. So that later can help students in understanding this lesson and make students not bored when looking at the learning media.

In this multimedia development, required a suitable specification for this application is with pc / laptop Intel Pentium 4 or AMD Athlon processor 64, Windows that still can use this application is Windows XP Service Pack 3 or Windows 7 Service Pack 1, Windows 8, 8.1 with some provisions, and the latest windows 10 now. The required RAM is 1 GB for viewing applications, but if you want to create learning media or want to improve

the media, it is actually recommended 3 GB RAM for 32 bit, and for 2 GB RAM (recommended 8 GB) for 64 bit. Hard disk space required 2 GB. At the beginning of this media work, all types of pc / laptop are still smoothly used, but if it is too much to be improved in this media, the pc / laptop starts to decrease its performance, so actually needed RAM in accordance with the recommendation (Ardilas, 2015).

Implementation Phase

This multimedia is tested feasibility to several experts, consisting of 4 expert constructs and 3 expert user. Validation is done 2 or more times, where the first validation for repair and second validation is the assessment. In the first validation a lot of improvements,

Table 1. Revised aspects

No	Revised Suggestion
1	Application for each formula
2	Fonts
3	Give questions before displaying animation
4	Clarify of KBM
5	The key answers to the problem are made separately.
6	Distinguish between quizzes and exercises
7	Provides multimedia help buttons and adds annotations on each key for easy key phrases
8	Gives an on / off button for background music
9	Create an evaluation that can be directly done on multimedia
10	Creating media in 1 KD

11	Improving the RPP
12	Improving the grammar of Indonesia
13	Clarify the writing of the formula
14	Using appropriate narration / audio with multimedia
15	Constructing learning lessons
16	Make multimedia as on-click
17	Writing titles on each sub-section in multimedia
18	Improvements in motion and images on the animation, to fit the learning and also add captions to the animation that are not yet complete with the description.
19	Fix video sequence at third meeting
20	Problem evaluation in the form of score and value and can answer the overall indicator
21	Add an exit button
22	Each question indicator is made up of easy, medium, and difficult questions
23	No need to use learning objectives
24	The colours on the multimedia are less interesting

Based on the suggestion from the validator, then performed the overall improvement. However, there are some suggestions that are not fixed overall, such as items 1, 20, and 22 that are applications for each use of the formula because only a few formulas can be written down. In this item, improvements are made to the problem, so the question has answered the whole indicator and in the form of a score. And also for item 22, each question indicator consists of easy, medium, difficult,there are some indicators that do not consist of the problem.

Table 2. Second Validation Activities

No	Validator Suggestions
1	Add Lorentz-style apps in the lesson
2	The buttons on the screen are replaced by Bahasa Indonesia
3	Making daily life as an apperception
4	Problems are also given narrative
5	Added the exit button on the exercise
6	Add a sample problem in formula
7	Fix and complement the lesson of each meeting by constructing the lesson so that the interaction is clearer
8	Add time to practice and evaluation questions

The fix for this second validation is not too much and not very significant. There are some suggestions that are fixed and some are not fixed. Suggestions that are not fixed like items 4 and 8. Due to the random form of random issues, it is difficult to give a narrative on each question. And also adding time to practice and evaluation questions, for this item is difficult because it has to repeat from the beginning again to change the coding used to fit.

Evaluation/Feedback (Evaluation)

The last stage is an evaluation. This stage is done for all phases in the ADDIE model. Each stages it through the evaluation in advance can only go to the next stage. At the final evaluation stage, the media is refined accordingly from the validator suggestion so that the media became interesting in terms of appearance and learning. If the media is valid, media is feasible to be applied in the learning process.The result of the validation of

interactive multimedia learning media is valid with the predefined score criteria.

Table 3. Average scoring by expert construct

No	Aspect	Rate	Descript
1	Design Aspect	3,41	Valid
2	Pedagogic Aspect	3,41	Valid
3	Aspects of Learning Contents	3,49	Valid
4	Aspects of User Convenience	3,63	Valid
	Average	3,49	Valid

In Table 3 assessment of the overall aspect by expert construct, the highest score is in the ease of the users with an average score of 3.63 while the lowest score is in the design and pedagogic aspects with an average score of 3.41. With the final average value is 3.49 which is in very high category.

Table 4. Average scoring by expert user

No	Aspect	Rate	Descript
1	Design Aspect	3,58	Valid
2	Pedagogic Aspect	3,50	Valid
3	Aspects of Learning Contents	3,71	Valid
4	Aspects of User Convenience	3,56	Valid
	Average	3,49	Valid

In Table 4 the overall assessment of aspects by teachers, the highest value is in the aspect of the content of learning with the average score of 3.71 while the lowest score is on the pedagogic aspect with the average score of

3.50. With the final average value is 3.59 which is in very high category.

Based on the validation assessment, the media is improved both in terms of construction and content side. In the process, this multimedia can lead to the perfection. So, in the final assessment of this multimedia, interactive multimedia physics learning media magnetic field using Adobe Flash otherwise have been validated with a very high category and is feasible for use in teaching and learning process.

This research is expected in line with Danijela (2014) research which states that multimedia application in physics learning resulted in a significant increase of the students' knowledge. A valid multimedia application in learning can improve understanding of physics concepts, thereby increasing the efficiency of physics learning.

Conclusion

Based on the results and discussion of this study, it can be concluded that the design and development of media obtained category average score of the instrument for the validity assessment consisting of design, pedagogical, learning content, and development by expert construct is very high category. And the expert user's rating is also very high category. So that interactive multimedia magnetic field is declared valid and feasible to be used as a media of physics learning for grade XII high school students.

This media is made for senior high school and media validation conducted with the teacher as an expert user and lecturer as an expert construct. For further recommendations, it is expected to create interactive multimedia on other physics lessons and empirically test the validity of the multimedia that has been made by researchers.

References

Ardilas.2015. *Spesifikasi Komputer Untuk Aplikasi/Software Adobe Ilustrator (Online).* www.ardilas.com (diakses 18 Mei 2016)

Ariesto Hadi Sutopo. 2003. *Multimedia Interaktif dan Flash*. PT Graha Ilmu. Yogyakarta

Danijela. 2014. The Aplication of Multimedia and its Effects on Teaching Physics in Secondary School. *Journal of IPI Serbia*, 339-363, 371.3:53 ISSN 0579-6431

Fatima. 2014. Implementasi Pembelajaran Kurikulum 2013 Berbasis Multimedia Interaktif Pada Pokok Bahasan Listrik Magnet Terhadap Aktivitas, Persepsi, Dan Hasil Belajar. *Jurnal Fisika Indonesia* No. 53, Vol XVIII, Agustus 2014 ISSN: 1410-2994

Gunawan. 2008. Model Pembelajaran Berbasis Multimedia Interaktif untuk Meningkatkan Penguasaaan Konsep Calon Guru pada Materi Elastisitas. *Jurnal Penelitian Pendidikan IPA.*Vol 2 (1), 11-22

Muhammad Nasir. 2014. Development and Evaluation of the Effectiveness of Computer-Assisted Physics Instruction. *Journal of International Education Studies*; Vol. 7, No. 13; 2014 ISSN 1913-9020 E-ISSN 1913-9039

Syamsudin. 2008. Penggunaan Model Pembelajaran Multimedia Interaktif Optik Geometrik Untuk Meningkatkan Penguasaan Konsep Dan Sikap Belajar Siswa, Tesis.SPs UPI. Bandung

Wiyono.2009. Penerapan Model Pembelajaran Multimedia Interaktif Untuk Meningkatkan Penguasaan Konsep, Keterampilan Generik Sains Dan Berpikir Kritis Siswa SMA Pada Topik Relativitas Khusus, Tesis.SPs UPI. Bandung

Yeni Agusti. 2013. Perancangan Aplikasi Pembelajaran Fisika Tingkat SMP Menggunakan Metode Computer Assisted Instruction. *Jurnal Pelita Informatika Budi Darma.* Volume: V, Nomor: 1, November 2013. ISSN: 2301-9425. Program Studi Teknik Informatika STMIK Budi Darma. Medan

Yudhi Munadi. 2008. M*edia Pembelajaran: Sebuah Pendekatan Baru*. Gaung Persada Pers. Jakarta