DEVELOPING INTERACTIVE MULTIMEDIA-BASED INSTRUCTIONAL MEDIA WITH ADOBE FLASH C.S.3 IN SUBJECT OF ALGEBRA OPERATIONS FOR SMP / MTS

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ABSTRACT

This research is based on the low interest and low student learning outcomes, the teachers' limited skills in the field of computers, and the limited time that teachers have. The purpose of the research is to develop and understand the feasibility of Interactive multimedia-based Instructional Media with Adobe Flash C.S.3 in the subject of Algebra Operations for SMP / MTs. This research was developed with ADDIE model (1) Analysis: At this stage, the researcher analyzed the curriculum, materials, technology, situation, and condition (2) Design: The researcher provided the reference of the book, arranged the material, made the flowchart and Storyboard. (3) Development: Furthermore, the product development was done, then the product was validated and revised according to the suggestion from 3 persons who expert in the materials,, a person who expert in the media field, and after that was tried for 12 students. (4) Implementation: This product was experienced in a large class with 39 students. (5) Evaluation: Qualitative data from the test was converted into quantitative data on a scale of 5, then the result was converted into qualitative data. This research succeeded in developing the media of mathematics with algebraic material for students of SMP / MTs. The assessment results from a multimedia expert have obtained an average score of 42 with good criteria, as well as the student response rating 54.9216 in good criteria. The Overall Quality of instructional media Obtained an average score of 181.9216 in good criteria. These results indicate that learning media is worthy of use as a medium of learning.

Keywords: instructional media, algebraic operations, interactive multimedia

INTRODUCTION

Education is crucial in human life. Article 31, paragraph 1 of the 1945 Constitution states that every citizen has the right to education. Both formal, informal, and non-formal education. In the world of education, various sciences are learned. One such science is mathematics. According to Sukardjono (2004: 13) said, Mathematics is a way/method of thinking and reasoning. Mathematics can be used to decide whether an idea is true or false, or at least there is a possibility of right. Mathematics is a field of exploration and discovery, where every day, new ideas are found. Mathematics is a way of thinking that is used to solve all kinds of problems in science, government, and industry.

Mathematics is a science that will often be found. That is because mathematics is a science that has many benefits. After all, it is realized or not, mathematics is often used in everyday life. However, lately, students assume mathematics is a complex science and challenging to learn. Therefore, learning resources are needed for students, so students can relearn material that has been delivered at school. In addition to learning resources, learning media are also needed. Asyhar, Rayandra (2012: 8) learning media is anything that can convey or channel messages from a source in a planned manner so that a conducive learning environment occurs where the recipient can carry out the learning process efficiently and effectively.

Learning media currently varies. The variety of instructional media shows that the development of instructional media is currently very rapid. At present, several teachers have used and used computer technology as a learning medium. The learning media utilizes some of the software that is on the computer. Among them is using Microsoft Office software and Portable Document Format (PDF).

Often teachers use the software resulting in the use of other software such as Adobe Flash CS3 software is still lacking.

Sunyoto, Andi (2010: 2) said that Adobe Flash is a superior multimedia software that was previously developed by Macromedia, but is now developed and distributed by Adobe Systems. Flash contains a scripting language that is named ActionScript. Flash is run using Adobe Flash Player. Flash file format is SWF (Shock Wave Flash) can usually be extensions. Swf, which can be opened via the web, but can also be opened in Windows with the extension. Exe.

Adobe Flash CS3 is software that can be used in creating and developing learning media. Adobe Flash CS3 can display text, images, animations, sounds, and videos simultaneously. With these advantages, Adobe Flash CS3 software is very supportive in making interactive multimedia-based learning media. Fahmi, Syahriful and Anggit Prabowo (2015: 1) suggest that multimedia in the context of learning is interpreted as language, then multimedia in that context is multilingual, i.e., there are languages that are easily understood by hearing, vision, smell, touch and so on or in other multimedia languages learning is a medium that can involve many senses and organs throughout the learning process.

Walker & Hess in Arsyad, Azhar (2013: 219) provides criteria in reviewing learning media software based on quality as follows: (1) Quality of content and objectives: (a) Accuracy; (b) Interests; (c) Completeness; (d) Balance; (e) Interests/concerns; (f) Justice; (g) Suitability of the student's situation. (2) Instructional quality: (a) Provides learning opportunities; (b) assisting with learning; (c) Quality to motivate; (d) Instructional flexibility; (e) Relationships with other learning programs; (f) The social quality of instructional interactions; (g) Quality of tests and reasoning; (h) Can have an impact on students; (i) Can have an impact on teachers and their learning. (3) Technical quality: (a) Readability; (b) Easy to use; (c) Display quality / impressions; (d) Quality of response handling; (e) Quality of program management; (f) Quality of documentation.

Based on interviews conducted by researchers with mathematics teachers at SMP Muhammadiyah 2 Kalasan on 20 April 2016, it is known that in mathematics learning, teachers use a variety of teaching aids to support the learning process. In addition to teaching aids, the teacher used a learning CD, but only once and was not the result of the mathematics teacher made but from the mathematics P4TK. The interviews between researchers and mathematics teachers at SMP Muhammadiyah Piyungan on three August 2016, revealed that many of the students' grades were still below average and had not yet reached completion scores. One of them is the material on algebraic operations. In the daily tests of algebra operations, the average score was 55.8333 with CCM 75. It shows that in the algebraic operating material, students' grades were still low. In teaching and learning, teachers have used learning media in the form of learning CDs. However, teachers cannot make it themselves, due to the teacher's limited expertise in the computer field and the limited time available by the teacher to make learning CDs.

The problem is (1) How is the development of interactive multimedia-based mathematics learning media with Adobe Flash CS3 on the subject of algebraic operations for SMP / MTs? (2) How is the feasibility of interactive multimedia-based mathematics learning media with Adobe Flash CS3 on the subject of algebraic operations for SMP / MTs developed?

This study aims to: (1) Develop interactive multimedia-based mathematics learning media with Adobe Flash CS3 on the subject of algebraic operations for SMP / MTs. (2) Knowing the feasibility of interactive multimedia-based mathematics learning media with Adobe Flash CS3 on the subject of algebraic operations for SMP / MTs developed.

RESEARCH METHOD

This research is a research development, where researchers use the development model ADDIE (Analysis, Design, Development, Implementation, Evaluation). The steps are

1. Analysis: Analysis of the VIII grade SMP / MTs mathematics curriculum on the subject of algebraic operations, Material analysis is choosing the material to be included in the learning

media, Technological analysis is carried out to find out the software that matches the ability of researchers, and situation and condition analysis are carried out to find out the situation and condition of the research site by observing.

2. Design: Prepare reference books, Arrangement of material, Develop learning media flowcharts, and Storyboard.
3. Development: Making learning media using Adobe Flash CS3 software (typing in material and question scripts, making animations, buttons, images, and giving music). After that, the program is presented in the form of a learning CD, and Then validation is done by the material and media experts, Then the product is revised I according to suggestions and input from material and media experts, revised, limited class trials were conducted, Furthermore, revision II.
4. Implementation: At this stage, a trial is carried out on a larger class.
5. Evaluation: At this stage, an analysis of the results of student response questionnaires was conducted on limited class trials and large classes to determine the feasibility of the learning media created.

Product Trial

1. Trial Design: This trial was conducted to obtain data that would be used to revise the product. Before the trial, the product is evaluated by material, and media experts, a revision of I. Then, a limited class trial is carried out, then a revision II is conducted.
2. Trial Subjects: The test subjects in this study were media experts, material experts, and students of SMP Muhammadiyah 2 Kalasan and SMP Muhammadiyah Piyungan.
3. Data Type: Qualitative data in the form of learning media feasibility data were obtained from the material and media expert feasibility test questionnaire and student responses. The questionnaire used uses the level of quality assessment, namely: SA (Strongly Agree), A (Agree), FA (Fair Agree), DA (Disagree), and SDA (Strongly Disagree). Quantitative data in the form of scores on the results of the feasibility test of learning media by material and media experts and the questionnaire scores of student's responses to learning media. The assessment scores are SDA (1), (2), FA (3), A (4), and SA (5).
4. Data Collection Instruments: Data collection instruments using interviews and questionnaires.
5. Technical Analysis of Data is Descriptive Data analysis Techniques and Questionnaire Analysis Process.

Table 1. Criteria for Ideal Rating Categories

No	Information	Score
1	$X > (\bar{X}_i + 1{,}8\ SB_i)$	Very Good
2	$(\bar{X}_i + 0{,}6\ SB_i) < \leq (\bar{X}_i + 1{,}8\ SB_i)$	Good
3	$(\bar{X}_i - 0{,}6\ SB_i) < X \leq (\bar{X}_i + 0{,}6\ SB_i)$	Enough
4	$(\bar{X}_i - 1{,}8 SB_i) < X \leq (\bar{X}_i - 0{,}6 SB_i)$	Less
5	$X \leq (\bar{X}_i - 1{,}8\ SB_i)$	Very Less

Source : Sukarjo (2006:53)

Information :

$\bar{X}_i$ = Average ideal score

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

SB_i = Ideal standard deviation

$SB_i = \left(\frac{1}{2} \times \frac{1}{3}\right) \times (ideal\ maximum\ score - ideal\ minimum\ score)$

Ideal maximum score = number of criteria x highest score

Ideal minimum score = number of criteria x lowest score

The feasibility of instructional media is determined by calculating the average score obtained from the validation of the material and media experts. The average score of the validator is then matched with the learning media eligibility table.

RESULTS AND DISCUSSION

The characteristics of learning media developed by researchers are

1. Development of this learning media using Adobe Flash CS3 software
2. This mathematical learning Media based on interactive multimedia with Adobe Flash CS3 on the subject of algebraic operations for SMP/MTs
3. This learning Media comes with instructions for using
4. This learning Media comes with the discussion of questions or critical answers
5. On the learning media, there are puzzle games and quizzes actual wrong examples of products produced:

Figure 1. Cover CD Learning

Figure 2. Display materials

Figure 3. Practice View

Figure 4. Puzzle View

This development of mathematical learning media resulted in an interactive multimedia-based learning media with Adobe Flash CS3 on the subject of algebraic operations for SMP/MTs. Learning media development steps are Through step analysis, design, development, implementation, and evaluation. The research was conducted in SMP Muhammadiyah 2 Kalasan and SMP Muhammadiyah Piyungan. The study was conducted on 7 February – 1 March 2017, the class used was a small class (with a total of 12 students) and a large class (with a total of 39 students). The research was conducted by using the LCD and computer, where researchers explained the learning CD developed. Students are then asked to operate the learning CDS independently, and students are asked to fill out a shared poll.

Before testing I, the product is first tested for eligibility for material and media experts. After the suggestions from the material and media, experts are followed up, and the interactive multimedia-based learning media is ready to be trialed. The first trial was conducted on 7 February 2017 at SMP Muhammadiyah 2 Kalasan with six students and at SMP Muhammadiyah Piyungan with six students. After the suggestions from students in the first trial are followed up, the product is ready to be tested on a larger class. Trial II was conducted on 8 February 2017 at SMP Muhammadiyah 2 Kalasan with 22 students and on 1 March 2017 at SMP Muhammadiyah Piyungan with 17 students.

The feasibility of instructional media was assessed by three material experts, namely, Drs. H. Edi Prajitno is a mathematics education lecturer at Ahmad Dahlan University, Lailatul Fuah, S.Pd.Si as a mathematics teacher at SMP Muhammadiyah 2 Kalasan and Mega Puspita Winahyu, S.Pd as a mathematics teacher at SMP Muhammadiyah Piyungan. The calculation of the feasibility of a learning media questionnaire by material experts can be seen in Table 2.

Table 2. Results of Calculation of Eligibility Questionnaire by Material Expert

No	Assessment	Total Score	Qualitative Criteria
1	Expert Material 1	43	Very Good
2	Expert Material 2	43	Very Good
3	Expert Material 3	40	Good
Mean		42	Good

Based on Table 2 shows that the learning media developed are seen in terms of the material included in the criteria both in the feasible category.

The feasibility of instructional media based on media aspects was assessed by Anggit Prabowo M.Pd, a lecturer in mathematics education at Ahmad Dahlan University. The results of the eligibility questionnaire calculations by media experts can be seen in Table 3.

Table 3. Results of the Eligibility Questionnaire Calculation by Media Experts

No	Assessment	Total Score	Qualitative Criteria
1	Media experts	85	Good
Mean		85	

Based on table 3 shows that the learning media developed are seen in terms of the media included in both criteria and the feasible category.

The feasibility of learning media based on student responses is known based on the results of the questionnaire given and filled out by students in SMP Muhammadiyah 2 Kalasan and SMP Muhammadiyah Piyungan during the trial of limited classes and larger classes. The calculation of the eligibility of student responses to learning media can be seen in Table 4.

Table 4. Percentage of Ideals and Quality of Each Aspect of Mathematics Learning Media

No	Aspects	Mean score	Mean score Ideal	Percentage of ideality	Criteria/Quality	Category
1	Media	85	105	80,9524%	Good	Feasible
2	Material	42	50	84%	Good	Feasible
3	Student response	54,9216	70	78,4594%	Good	Feasible
Average		181,9216	225	80,854%	Good	Feasible

Based on Table 4, it can be seen that students' responses to the combined calculation of student questionnaire responses in limited class trials and more extensive class trials show a combined average of 54.9216 and are included in either category.

Determination of the quality of mathematics learning media based on the assessment of 3 material experts, one media expert, 12 students in limited class trials, and 39 students in large class trials. The data obtained were analyzed to determine the quality of instructional media.

Based on the technical analysis of the data used, the data obtained from the assessment of experts and students in the form of qualitative data is transformed into a quantitative form. The resulting quantitative data is then tabulated and analyzed for each assessment instrument. The final score obtained is converted to a qualitative level of product eligibility using ideal assessment criteria. Based on the ideal assessment criteria, it is obtained the quality of the mathematics learning media from each aspect of the assessment presented in Table 5.

Table 5. The calculation result of student response eligibility

No	Assessment		Total Score	Mean score	Qualitative criteria
1	SMP Muh. 2 Kalasan	Trial I	318	53	Good
		Trial II	1208	54,9091	Good
2	SMP Muh. Piyungan	Trial I	365	60,8333	Very Good
		Trial II	910	53,5294	Good
Mean				54,9216	Good

The final assessment score obtained for mathematics learning media is 181.9216, from a maximum score of 225 with an ideal percentage of 80.854% with the Good category. It is declared as a source of learning and learning media for mathematics algebraic operations for grade VIII students of SMP / MTs.

CONCLUSION

This development research produced is algebraic operation Learning Media packaged in the form of learning CDS with the following characteristics: (1) according to Competency Standards (CS) and Basic Competencies (BC), (2) presented in simple language so easy Understand, (3) easy to use in any computer program, (4) There are a puzzle game and the quiz is right wrong. This learning Media was developed using Adobe Flash CS3 software. This media of mathematics learning is developed using the ADDIE development model (Analysis, Design, Development, Implementation, and Evaluation). The trial in two schools, namely SMP Muhammadiyah 2 Kalasan and SMP Muhammadiyah Piyungan. The trial is done twice, i.e., small/limited-class trials and a large-class trial. The study subjects were lecturers, teachers, and students of SMP Muhammadiyah 2 Kalasan and SMP Muhammadiyah Piyungan class VIII. Collection of data using polls, interviews, and observations directly. The result of learning of algebraic operations is as follows: (a) Loading or opening page (b) main Menu (c) Instructions for use (d) standard competency and basic competence (e) Indicators (f)

materials (algebraic operation material, an underlying sense of operation Algebra, calculate operation, the factoring of algebra, fractional operations algebraic form, exercise problem, evaluation, right wrong quiz, Puzzle) (g) Developer profile

The feasibility of interactive multimedia-based mathematics learning with Adobe Flash CS3 on the subject of algebraic operations for SMP/MTs is the feasibility test of three material experts gaining an average score of 42 and a percentage of 84% with criteria Worth. The media expert's feasibility test acquired an average score of 85 and a percentage of 80.9524% with decent criteria. While the student's response to the media learning has an average score of 54.9216 and a percentage of 78.4594% with good criteria, while the overall quality of learning is achieved by an average score of 181.9216 and a percentage of 80.854%. Thus, with good criteria, the interactive learning media in the form of learning CDS developed by researchers deserves to be used in mathematics learning.

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