

Electronic Mathematics Student Worsheet Development Using Adobe Flash CS6

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1 Electronic Mathematics Student Worksheet Development using Adobe Flash CS6

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ABSTRACT

This study discusses the development of electronic mathematics student worksheets assisted by Adobe Flash CS6 at SMAN 2 Palopo. Electronic student worksheets in mathematics were developed with the help of Adobe Flash CS6 in the form of applications that can be accessed via Android or computers. The development of this learning application was carried out using research and development (R&D) research with the ADDIE model. The data used was based on data from the validation results from media expert validators and material expert validators obtained from the questionnaire instrument; data from the practical test obtained from the results of questionnaires distributed to students; and data obtained from the effectiveness test through the results of questionnaires and material test tests given to students. Based on the results of the data analysis, this learning application has met the requirements for being valid, practical, and effective so that it can be used in the learning process.

Keywords: Composition Function, Mathematic Electronic Student Worksheet, Adobe Flash CS6.

1. INTRODUCTION

Education is a deliberate attempt to maximize one's potential in order to have the capacity to learn. Students in social life need to have religious spiritual strength, self-control, intelligence, personality, noble character, and skills that support them in social life. With education, students are expected to be able to develop their potential so that human civilization is not hampered due to ignorance. In Islam, education is very important because people who have extensive knowledge, especially about religion, are highly respected, as explained in Q.S At-Taubah/9: 122

"And it is not proper for all the believers to go (to the battlefield). Why don't some members of each group go to further their religion and inform their people when they return such that they can look after themselves?" [1].

The verse explains that it is important for a person to seek knowledge because Allah says that those who go out to gain knowledge are part of the religious jihad. Therefore, with education, a person can get out of ignorance so that they can build an advanced generation and be able to compete in the era of globalization. In order to carry out the learning process in schools, one of the facilities needed is student worksheets (LKS). With the LKS, it will form an effective interaction between teachers and students, so as to increase student learning activities and improve learning achievement [2].

Using of technology in education will continue to adapt to the development of technology so that efforts to improve the quality of education are achieved properly [3]. Developing information and communication technologies helps encourage

renewal efforts in the use of technology in the teaching and learning process, so that teachers are required to be able to create learning media that will be used [4]. One implementation of the use of technology in the educational aspect is the use of LKS teaching materials, which are generally printed on opaque paper, with some images that are not clear and only contain practice questions. This gives the impression of LKS being boring, so that student interest is reduced in the learning process [5]. while the electronic LKS in its presentation is in the form of files equipped with audio and video in its presentation [6].

This electronic LKS teaching material can be used anywhere and anytime; it is presented in the form of an application and does not require internet network assistance. Learning mathematics using electronic worksheets has an impact on students' problem-solving abilities [7]. The learning material in this research is the composition function, which consists of the properties of the composition function and determine the composition function and other functions. The composition function learning material will be easier to understand by using direct depictions packaged in learning media so that it is effective and efficient for students to learn [8].

The Adobe Flash CS6 application is software for making interactive learning media based on several advantages. One of the advantages of Adobe Flash CS6 is that it is interactive, so it is suitable for use in making learning media [9]. According to Macdoms, the use of Adobe Flash CS6 is very interactive and can combine graphics, animation, and sound [10]. With the help of Adobe Flash CS6 in making electronic student

worksheets, it can help students in the learning process [11].

This study is in line with the research conducted by A.H. Zulkarnain et al. where the learning media were developed with the help of Adobe Flash CS6 [12]. However, the final result of the learning media carried out by A.H. Zulkarnain is android-based with the media development model developed [1] Plomp. The output developed by the researcher is in the form of electronic LKS teaching materials with the ADDIE development model.

The results of an interview with one of the mathematics teachers at SMAN 2 Palopo said that the material presented was using textbooks and assignments that were distributed to students via the WhatsApp application. This is done in the online learning process, and the learning process still uses conventional learning methods. According to Zainuddin, a person can only remember 20% when he sees, 30% when he hears, and 50% when he sees and hears, but one can remember 80% when one sees and practices it [13].

Based on this, learning media that can encourage students to be more active in the learning process are needed. One of the interactive learning media that can be used is an electronic mathematics student worksheet with the help of the Adobe Flash CS6 application, which will help students in the learning process.

2. METHOD

This type of research is development research. In this study, learning media will be designed using the ADDIE (Analyze, Design, Development, Implementation, Evaluation) development model.

The data derived from the research findings are divided into two categories: qualitative data and quantitative data. Qualitative data in the form of criticism and suggestions put forward by material expert validators and media expert validators that researchers collect to improve the products developed. While quantitative data was obtained from a validation questionnaire that used a 4-point Likert scale (very bad, not good, good, very good).

Based on the validation questionnaire, practicality questionnaire, and effectiveness questionnaire that have been filled out by each validator and several students, the percentage can be found using the formula:

$$\text{Percentage} = \frac{\sum \text{Score per item}}{\text{maximum score}} \times 100\%$$

Based on the results, the percentage is then categorized as in table 1 to 3.

Table 1. validity Criteria

Score	Validity Category
85,01-100,00%	Very valid
70,01-85,00%	Fairly valid
50,01-70,00%	Less valid
01,00-50,00%	Invalid

Table 2. Practicality Tests Category

%	Category
75,01-100	Very practical
50,01-75	Practical
25,01-50	Less practical
0-25	Not practical

Table 3. Effectiveness Test Category

%	Category
85% ≥ RS	Very effective
70% ≤ RS < 85%	effective
50 ≤ RS < 70	Less effective
RS < 50%	Ineffective

3. RESULTS AND DISCUSSION

Electronic student worksheets with the help of Adobe Flash CS6 with compositional function materials obtained through the stages of needs analysis, curriculum analysis, reference collection, user interface design, compiling indicators of electronic LKS assessment, product improvement based on input and suggestions from media expert validators and material expert. The steps for the development of teaching materials for mathematics electronic student worksheets assisted by adobe flash cs6 material composition functions as follows:

3.1 Analysis Stage (Analyze)

3.1.1. Needs Analysis

Based on the results of the pre-research conducted on March 26, 2021, an interview was conducted with the mathematics teacher Mr. Isradil Mustamine, S.Pd., M.Pd. He said that the teaching materials currently available are adequate but there are still some that are lacking because sometimes the printed books that are commonly used sometimes lack the details of the material presented. He added that the learning media he used werewhatsapp group, google Classroom, google meet, platform youtube. The use of teaching materials in the form of electronic student worksheets is still rarely used at SMAN 2 Palopo, in learning he has also never used assisted mathematics electronic student worksheets adobe flash cs6. The solution to solving this problem is to update learning resources such as electronic student worksheets to support existing books so that students will prefer learning mathematics. Researchers also distributed questionnaires via google form to class X IPA 3 students to find out what teaching materials are expected according to the situations and conditions during the pandemic.

Based on these problems, the researcher chose to develop assisted mathematics electronic student worksheets adobe flash cs6 to minimize online learning difficulties experienced by teachers and students in the future pandemic covid-19, by making electronic math student worksheets with

the help of the application adobe flash cs6 can be learned easily and can be accessed without the help of an internet network or quota.

3.1.2. Curriculum Analysis

From the curriculum analysis it was found that the curriculum used at SMAN 2 Palopo was the 2013 curriculum.

3.2 Planning Level (Design)

Planning stage (design) This is the next stage, in designing the researcher carried out several activities, namely as follows:

3.2.1. Data Collection

Data collection was carried out after analyzing competency standards, basic competencies and indicators as well as other teaching materials. The collection of data in the form of material can be seen in books that contain compositional function material. After all the references have been collected, the next thing to do is to make a summary of the composition function material in Microsoft Word and then enter it into the application adobe flash cs6.

3.2.2. Making an E-LKS Plan

At this stage, after collecting the data, the next thing to do is to make a design related to the teaching materials of assisted mathematics electronic student worksheets.adobe flash cs6. Making this design developed into teaching materials for electronic mathematics student worksheets, then there are several components that need to be included in teaching materials so that they are neatly arranged, systematic and achieve learning goals.

3.2.3. Instrument Design

The design of the instrument begins with compiling a lattice of validation sheets, practicality test sheets, and effectiveness test sheets. Meanwhile, the practicality test sheet and effectiveness test sheet were given to 13 students to find out the practicality and effectiveness of the teaching materials for assisted mathematics electronic student worksheets.adobe flash cs6 in the learning process.

3.3 Development Stage (Development)

At this development stage to develop the design at a later stage. Activities carried out at the development stage are:

3.3.1. Making Draft E-LKS

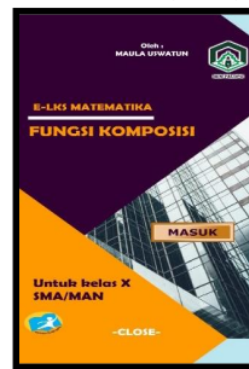
Making draft e-lks is done by combining all the designs made at the planning stage (design), the design of the e-lks can be seen as follows: a) Cover, contains the author's name, IAIN Palopo logo, subjects, classes, topics/materials, and the k13 logo, b) The main menu on the E-LKS contains the author's name, IAIN Palopo logo, and buttons: back, kd/gp, learning objectives, concept maps, materials, evaluation, profiles and instructions., c) Instructions for Use of assisted

math e-works adobe flash cs6, d) The introduction contains KD/GPA, learning objectives, and concept maps, e) Learning Activities, f) Closing.

The final result of the learning media in the form of an electronic mathematics student worksheet, assisted by Adobe Flash CS6, which was developed, is divided into several parts, including:

3.3.1.1. Initial Display

The initial display of the electronic mathematics student worksheet is designed using the Adobe Flash CS6 application. This initial display contains the name of the learning medium, namely the electronic student worksheet (E-LKS).



Information:

- Composition Function
- Click the Login Button

Figure 1 Initial Display of E-LKS Mathematics

3.3.1.2. Menu

The main menu display consists of instructions for use, basic competencies/indicators of competency achievement, learning objectives, concept maps, materials, evaluations, and profiles and is accompanied by a back button and a close button.



Information:

- Main course

Figure 2 Main Menu Display

3.3.1.3. Theory

The presentation of the material is adjusted to the k13 curriculum and the syllabus of SMAN 2 Palopo. In this main menu display, there is material related to the composition function, sample questions, and learning videos.



- Information:
- The material view contains the definition of the composition function



- Information:
- The function of the composition is found in everyday life, for example in pepek submarine food.

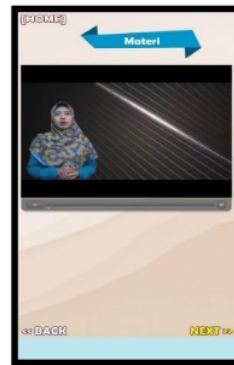
Figure 3 Material Display



- Information:
- Examples of questions related to the composition function material in klepon cake food. There is an answer box for

students to answer the sample questions given

Figure 4 Display Sample Questions

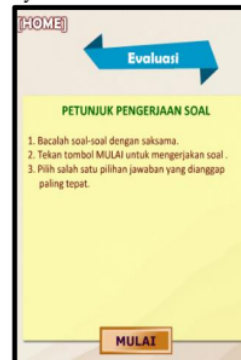


- Information:
- Learning videos related to composition function material.

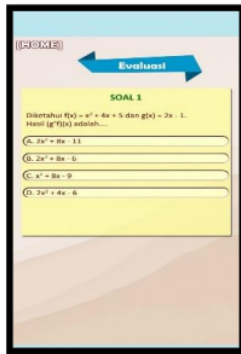
Figure 5 Learning Video Display

3.3.1.4. Evaluation

In the evaluation display, there are 10 multiple-choice questions. Before working on the questions, students are first directed to read the instructions for working on the questions, then click the Start button. The score results will come out after working on the questions automatically.



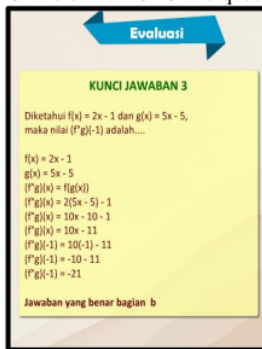
- Information:
- Read the questions carefully.
 - Press the Start button to work on the problem. Choose one of the answer choices that is considered correct.



Information:
 - There are 4 answer choices: A, B, C, and D.



Information:
 - Displays correct answers and incorrect answers.
 - Display of total scores
 - There is a "Repeat" button to repeat the question. There is an Answer Key button to view the answers along with how to work on the evaluation of the questions.



Information:
 - The answer key contains how to work on question number 3
Figure 6 Evaluation Display, Score, and Answer Key

3.3.1.5. Compiler Profile

The profile view contains profiles of application developers, supervisors, and study programs.



Information:
 - Application developer name
 - Name of Supervisor Study program

Figure 7 Profile Display



Information:
 - Display when you want to close the application.

Figure 8 Close Display

3.3.2. Assisted E-LKS Product Validation Adobe Flash CS6

The validity assessment was carried out by 1 media expert validator and 2 material experts. The e-LKS validity assessment was assessed from 3 validators, namely 2 material expert validators and 1 media and design expert validator. Two validators are IAIN Palopo lecturers who simultaneously validate the instruments of practicality test sheets and effectiveness test sheets, and one math teacher at SMAN 2. The results of the validation of the developed 2 teaching material products are described as follows:

Table 4. Media Expert Validation Score Results

No	Rated Aspect	Validation	Score Max	%	Category
2	Background color compatibility with text	3	4	75	Fairly Valid
3	Interesting visualization in E-LKS media assisted by <i>Adobe Flash CS6</i>	3	4	75	Fairly Valid
4	<i>Adobe Flash CS6</i> aids in the clarity of writing and font size in E-LKS media.	3	4	75	Fairly Valid
5	Interesting display of material content on E-LKS assisted by <i>Adobe Flash CS6</i>	3	4	75	Fairly Valid
6	<i>Adobe Flash CS6</i> was used to help with color composition on the e-lks display.	3	4	75	Fairly Valid
7	Using clear directions and instructions so as not to cause double interpretation	3	4	75	Fairly Valid
8	E-LKS is aided by <i>Adobe Flash CS6</i> and is accompanied by table illustrations and images related to the subject matter or concepts discussed.	3	4	75	Fairly Valid
9	Illustration of tables, pictures made with layout effectively	3	4	75	Fairly Valid
10	table illustrations, pictures are made attractive, clearly legible, and easy to understand.	3	4	75	Fairly Valid
11	efficiency of using media in relation to time.	3	4	75	Fairly Valid
Average				75%	Fairly Valid

Table 5. Material Expert Validation Results

No	Rated Aspect	Validation		Amount	Score Max	%	Category
		I	II				
1	Basic competencies based on the 2013 curriculum	3	4	7	8	87,5	Very Valid
2	Formulate a clear, specific, and operational description of the basic competencies.	3	3	6	8	75	Fairly Valid
3	Formulas according to the level of development of students	3	3	6	8	75	Fairly Valid
4	According to the content of the material, it motivates users.	4	3	7	8	87,5	Very Valid
5	In accordance with the concept or subject matter	4	3	7	8	87,5	Very Valid
6	The suitability of the material on E-LKS is assisted by <i>Adobe Flash CS6</i> with existing materials.	4	3	7	8	87,5	Very Valid
7	The suitability of the matter to the subject matter	3	3	6	8	75	Fairly Valid
8	Accurate use of terms and symbols	3	3	6	8	75	Fairly Valid
9	Using good and correct mathematical symbols.	4	3	7	8	87,5	Very Valid
10	The language used to explain the subject matter is easy to understand.	3	3	6	8	75	Fairly Valid
11	Using good directions and guides.	4	3	7	8	87,5	Very Valid
12	Developing process/problem solving skills in <i>Adobe Flash CS6</i> -assisted Math E-LKS	3	3	6	8	75	Fairly Valid
13	can change the habit of teacher-centered learning to student-centered learning.	3	3	6	8	75	Fairly Valid
Average						80,7%	Fairly Valid

Based on the results of the media expert validation assessment, the product developed in the form of teaching materials for electronic mathematics student worksheets assisted by Adobe Flash CS6 explained that the average value of the total validity of electronic mathematics student worksheets assisted by Adobe Flash CS6 was 75%. This indicates that the value is in a fairly valid category. Thus, in terms of media and design aspects, it is stated that it meets the criteria for validity with a fairly valid category.

The results of the expert validation of the material and contents of the electronic mathematics student worksheets assisted by Adobe Flash CS6 that have been developed explain that the average value of the total validity of the electronic mathematics student worksheets assisted by Adobe Flash CS6 is 80.7%. This value is included in the category of quite valid. So, in terms of all aspects of the material/content, it is stated that it meets the criteria of validity with a fairly valid category.

At the trial stage of the developed product, it was carried out on 12 students of class X IPA 3 SMAN 2 Palopo to determine the level of practicality and effectiveness of the product.

3.4. Implementation Stage (Implementation)

To find out the practicality and effectiveness of the product made, trials were carried out. Implementation of limited trials by class X IPA 3 students of SMAN 2 Palopo session 1, totaling 13 people offline, by providing practicality test instruments and instruments to test the effectiveness of assisted mathematics electronic student worksheets adobe flash CS6. The aspects assessed in the practicality instrument sheet consist of three, namely appearance, ease of use, and presentation of the material. Whereas on the effectiveness test instrument sheet, there are two aspects that are assessed, namely the effectiveness and efficiency of assisted mathematics electronic student worksheets adobe flash CS6. The following are the results of practicality trials and effectiveness tests:

Table 6. Practicality Test Score Results

Practicality	Rated Aspect	Score Acquisition	Scor Max	Percentage	Average
Students	Display	137	156	87,8% (very practical)	86,9% (very practical)
	User Ease	230	260	88,4% (very practical)	
	Material Presentation	267	312	85,5% (very practical)	

Table 7. Effectiveness Test Score Results

Effectiveness	Rated Aspect	Score Acquisition	Scor Max	Percentage	Average
Students	Effective	49	52	94,23% (very effective)	94,6% (very effective)
	Efficient	62	65	95,38% (very efficient)	

Based on the results of the practicality test in class X IPA 3 SMAN 2 Palopo, the product that has been developed in the form of teaching materials for electronic mathematics student worksheets assisted by Adobe Flash CS6 obtained the display aspect with a percentage of 87.8%, including the very practical category. The aspect of user convenience, with a percentage of 88.4%, belongs to the very practical category to use. Based on the presentation aspect of the material, the category is very practical based on the percentage of 85.5%. Thus, the Adobe Flash CS6-assisted electronic mathematics student worksheet with composition function material with an average percentage of 86.9% meets the practicality criteria in the very practical category.

The results of the effectiveness test were obtained by calculating the percentage of the results of the instrument given to obtain an average percentage of 94.6% with the criteria of "very effective". There are 2 people who have not finished with a score below 80 and 11 people who have completed. The results of questionnaires and learning tests obtained a percentage of 89.5%, with a very effective category.

3.5. Evaluation Stage (Evaluation)

In the ADDIE model there are two types of evaluation, namely formative evaluation and summative evaluation. Formative evaluation in development is carried out at the end of the stage. Meanwhile, summative evaluation is developed after testing the validity, practicality and

effectiveness. Based on the results of the formative evaluation, ³ the analysis stage the researcher determines the learning materials that will be developed for students using the 2013 curriculum based on the conditions at SMAN 2 Palopo. ³ Furthermore, at the initial product development stage, the researcher designs storyboard product based on the results of the analysis that has been carried out and develop instrument indicators to be used. At the development stage the teaching materials that have been made will be validated by the validator. Teaching materials that have been validated, researchers revise the product based on suggestions and input from the validators.

The summative evaluation is carried out after the product is distributed to students. The teaching material is in the form of assisted mathematics electronic student worksheets adobe flash cs6 evaluated its practicality and effectiveness by class X IPA 3 students.

4. CONCLUSION

The development ¹ of mathematical electronic student worksheets with the help of Adobe Flash CS6 has met the requirements for use based on the results of the average validator of media & design experts and validator of material experts, which is 77.85%. The results of the practicality test of students obtained an average percentage of 86.9% in the very practical category. The results of the effectiveness test through the distributed instruments and student learning test results got an average percentage of 89.5% with a very effective category.

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