
ENHANCES OF COMPUTER-BASED LEARNING MATHEMATICS WITH MATLAB MEDIA

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Abstract

This aims of paper learning media education mathematic which valid and practical. The researcher uses design type of development study with two stages, namely the preliminary stage and the prototyping stage. In the preliminary stage, the researcher analyzes the material in a flat shape and continues with making a flowchart to determine the order in which the material will be displayed on the learning media. At the prototyping stage, researcher use a formative evaluation flow consist of self-evaluation, expert review, one-to-one, small group, and field tests. In this study, the flow carried out only reached the small group stage. Data were collected by walkthroughs, questionnaires, interviews, and test.. The result of this study is a learning media which produced is valid and practical. The validity of a learning media is shown from the results of validation at the expert review and one-to-one stages which state that learning media are good in terms of content, construct, and language. The practicality of a learning media is also seen at the small group stage that students can use learning media well, can help students understand the material, and students are interested in using it.

Keywords: Design Research, Learning Media, Plane Figures

I. INTRODUCTION

All levels of education require mathematics to be studied. Mathematics is a subject that is studied sequentially where each material is related to the previous material (Brođanac, Budin, & Jakobović, 2011). In learning mathematics, you should learn the concept first. One of the goals of learning mathematics is to make someone have to understand the concept rather than memorize fully a material in mathematics (Effendi, 2008). A learning must have something that is unique to the learning experience of students so that students gain that experience as a memory that lasts for a long time so that it sticks to the mindset of the student (Effendi, 2008). So, learning mathematics by understanding the concept is very important for students, because students' memory will be stronger and will last for a long time (Azam, 2017).

Flat build is a material taught to VII grade students of junior high school. A flat building is a structure that only has a circumference and area consisting of several types, namely square, rectangular, triangle, trapezoidal, kite, rhombus, parallelogram, and circle (Effendi, 2008). In the flat figure material there are indicators regarding the area of the flat figure. Sartika (2013) states that in learning material, the flat area of the teacher only writes and then instructs students to memorize the flat formula area directly and in solving examples of questions the teacher directly uses the formula and then calculates the answer. Hidayati

(2014) stated the teacher only described a flat figure model on the blackboard making students less interested in learning because there were no tangible objects that they could observe or lack of media used. So, this material of flat area is taught directly to the core of its broad formula without explaining the concept of the formula of flat area. Explaining or describing the concept on the board makes students confused because of difficulty understanding what is explained on the board. This was done because of the limitations of the media owned. Therefore, a teacher must provide a learning medium that can indeed help in learning so that what students learn really sticks in their memories for a long period of time several types of learning media, namely print media, audio-visual media, computer media, and others. One of them that the teacher can use to help him deliver the material is computer-based learning media. Priyatmoko (2016) states the world of education can become easier with the presence of computers. Agree with Arianto (2015) that computers should be used as tools that help students to build knowledge. Computers have a combination of audio visual elements, provide the required content, and are easy to use (Azam, 2017). With the help of computers a learning media can be created to support quality learning activities (Azam, 2017). So that the material of a flat figure in the discussion of the area of a flat figure that requires pictures in explaining the concept of the formula of the flat figure area will be easier to understand (Aryza, et al., 2018).

One of the software used to create the media is the Matlab. Matlab was originally a Mathematic modelling. This is very much in accordance with the area of the flat figure which requires explanation with moving flat figure images to explain the broad formula concept.

II. METHODS OF RESEARCH.

This research method uses development research (development research). According to Van den Akker (1999) there are three criteria in development, namely validity, practicality, and effectiveness.

- a. Validity refers to in terms of content, construct, and language. So, learning media is said to be valid if it is suitable in terms of content, construct, and language.
- b. Practicality refers to the attractiveness and ease of user. So, learning media is said to be practical if it is interesting and easy to use by users in this case students.
- c. Effectiveness refers to the achievement of desired goals. So, learning media is said to be effective if the achievement of learning objectives seen from student learning outcomes.

In this study, researchers developed computer-based learning media on a wide area of valid and practical flat shapes. In this development consists of two main stages, namely the preliminary stage (preparation phase) and the prototyping stage (development stage) using formative evaluation flow consisting of self evaluation, expert review, one-to-one, small group, and field test (Tessmer) 1993; Zulkardi 2006). The formative evaluation stage can be seen in Figure 1.

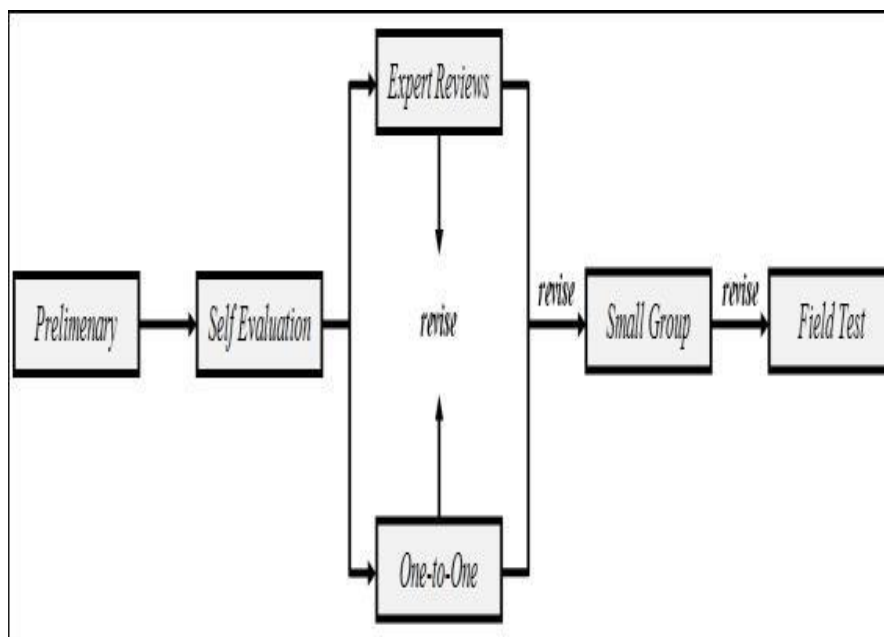


Figure 1. Formative Evaluation Diagrams.

The wisdom of the learning media developed in this study was obtained after going through the expert review and one to one stages, while practicality was obtained after the learning media went through the small group stage. In this study the formative evaluation flow discussed only reaches the small group stage. The study was conducted in odd semester 2018/2019 academic year. The research subjects were vocational high school students.

Data collection techniques used were walkthroughs, questionnaires, interviews, and tests. Walkthrough is used at the expert review stage, where the researcher meets the validator and asks for the validator's opinion by giving Prototype 1 to be validated in terms of content, construct, and language. The questionnaire was used at the expert review, one to one, and small group stages. Interviews are used in the one to one and small group stages. Questionnaire and interview aims to get comments or suggestions from the validator and students about the product being developed so that it becomes material to revise the product. The test is used at the small group stage. At the small group stage, after students use the developed learning media, students are given test questions to see whether students can understand the material in the developed media or not. Then the data were analyzed qualitatively.

III. ANALYZE AND RESULT.

The Analyze and Results of this paper in below:

a. Preliminary Stage

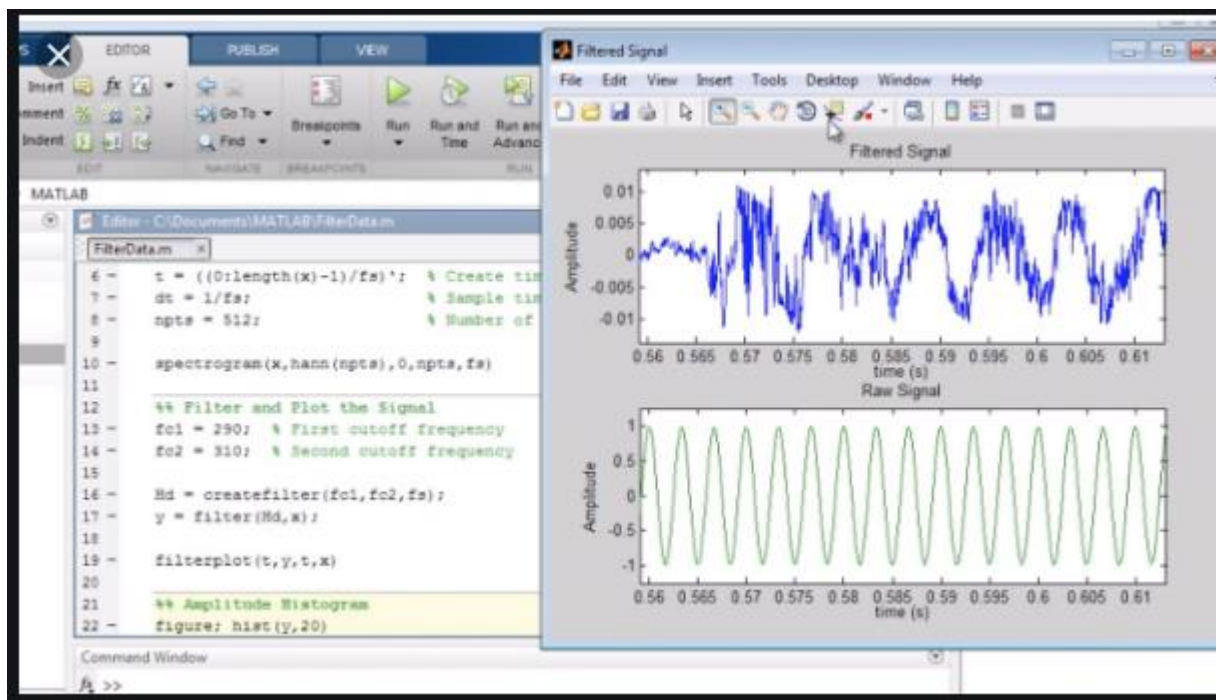
In the preliminary stage, researchers conducted an analysis of the material to build flat. This stage aims to choose the material that will be displayed on learning media using Adobe Flash Pro CS6. Then this stage is continued by making a flowchart which aims to determine the sequence of learning material that will be displayed on learning media.

b. Prototyping Stage

The second stage of this research design is the prototyping stage using formative evaluation flow. The stages carried out in formative evaluation are as follows:

c. Self-Evaluation

In the self-evaluation stage, researchers create computer-based learning media product designs using Adobe Flash Pro CS6. The results of the product designed in the self evaluation stage are called prototype 1. Prototype 1 shown has focused on three main characteristics namely content, construct, and language. The following is a display of prototype



Figures 2. Menu of Matlab

4.1. Expert Review

At the expert review stage, researchers ask for comments and suggestions to experts through a validation sheet to see the validity of learning media in terms of content, construct and language. The prototype 1 validation process was carried out with a walkthrough and the validator was David SE,MPd.. who is a lecturer from Universitas Harapan Medan. Comments and suggestions obtained from the expert test results are used as a reference for the development of prototype 2. The following is the section that the validator and comments provided.



Table 1. Comments validator expert review stage

No.	Sections	Comment
1.	Basic Competence	Improve Basic Competencies, choose only one Basic Competency
2.	Indicator	in accordance with the material in the media.
3.	Purpose	The indicators are broken down again into flat builds.
4.	Definition Area	The goal is translated into a flat construction.
5.	Circle Material	Improve the definition of area with sentences that are easy to understand.
6.	Practice Questions	Circle material is deleted because it's not in the Indicator.

4.2. One to one

In the one-to-one stage, prototype 1 was piloted along with the expert review stage. This prototype 1 was tested on 2 colleagues. Following are the names of peers who become validators in the one-to-one stage.

The validity of this learning media is shown based on the results of the validator's assessment at the expert review and one-to-one stage which states that the learning media developed has been good in terms of content, construct, and language. The researcher gave prototype 1 learning media to 3 validators, including 1 lecturer at the expert review stage and 2 colleagues at one to one stage. Van den Akker (1999) states that a product is said to be valid if the learning content is listed according to the demands of the curriculum, the learning construct is seen from the correct use of theories that are used as a handle in the preparation of instructional media, and the language used in instructional media can be well understood.

After the researcher revised the learning media based on comments and suggestions, the learning media can be tested and validated qualitatively by the validator, both in terms of content, construct, and language. Valid in terms of content, i.e. the contents of the learning media are in accordance with the curriculum. Valid in terms of construct, namely learning media can support the learning process. Valid in terms of language, which is the language used in learning media is a good and correct Indonesian language, the sentence is in accordance with the level of students' thinking and does not have a double meaning.

The learning media developed have also been declared practical based on the results of questionnaires, interviews, and tests at the small group stage. Van den Akker (1999) states that practicality is seen from the extent to which the user considers the product developed to be attractive and can be used under normal conditions. During the implementation of the small group students were seen to be able to use learning media, although some students still needed help from researchers in using this learning media because students were not accustomed to using computers. Students become helped in understanding the material of flat build, and students are interested in learning to get up flat with the learningmedia

IV. CONCLUSION.

This research has produced a computer-based learning media with Adobe Flash Pro CS6 on a wide area material that is valid and practical. The validity of instructional media is shown from the results of the validator's assessment at the expert review and one-to-one stage which states that the learning media have been good in terms of content, construct, and language. Valid in terms of content, i.e. the contents of the learning media are in accordance with the curriculum. Valid in terms of construct, namely learning media can support the learning process. Valid in terms of language, which is the language used in learning media is a good and correct Indonesian language, the sentence is in accordance with the level of students' thinking and does not have a double meaning. The practicality of instructional media is also seen at the small group stage that students can use learning media well, can help students understand the material, and students are interested in using it.

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