Interactive learning media based on flash for basic electronic engineering development for SMK Negeri 1 Driyorejo - Gresik

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Abstract. This research aims to produce a product in the form of flash based interactive learning media on a basic electronic engineering subject that reliable to be used and to know students' responses about the media. The target of this research is X-TEI 1 class at SMK Negeri 1 Driyorejo – Gresik. The method used in this study is R&D that has been limited into seven stages only (1) potential and problems, (2) data collection, (3) product design, (4) product validation, (5) product revision, (6) field test, and (7) analysis and writing. The obtained result is interactive learning media named MELDASH. Validation process used to produce a valid interactive learning media. The result of media validation state that the interactive learning media has a 90.83% rating. Students' responses to this interactive learning media is really good with 88.89% rating.

1. Introduction

Education is a series of efforts by educator to help the student to improve their education, character, mind, personality [1]. The purpose of Indonesia national education is stated in number 20 article 3 year 2003 of the constitution. It can be achieved if education proceeds as expected. There are internal and external factors that influence the learning process to achieve educational goals. One of the external factors is the tool used to learn. By the time, the using of learning media is growing, one of the examples is by using a computer.

Based on needs assesment in SMK Negeri 1 Driyorejo found problem those are: (a) lack of interactive learning media, (b) lack of learning modules that can be borrowed, and (c) limited basic electronic props. Students think that the media that used so far in the SMK Negeri 1 Driyorejo is less attractive. Based on that background this research is conducted to answer one of the problems in SMK Negeri 1 Diryorejo. The aim of this research is to produce a valid interactive learning media named MELDASH.

In this research there are some limitations of the problem, those are (a) Every grade X student has a computer with minimal resolution 800 x 600 pixels; (b) MELDASH is only made for 5 basic competencies, those are (i) understanding atomic model of semiconductor material; (ii) applying a semiconductor diode as a rectifier; (iii) plotting the zener diode as a voltage stabilizer circuit; (iv) applying special diodes such as LED, varactor, schottky, PIN, and tunnel in electronic circuits; and (v) understanding the basic concepts of bipolar junction transistors (BJT) as amplifiers and switch

devices; (c) the material contained in MELDASH is limited only for achieving the indicators contained in Kurikulum 2013 syllabus; and (d) MELDASH is only tested in X-TEI 1 and X-TEI 2 class.

The word media derived from the Latin, the plural of the medium which means "intermediary" or "agent", and its keyword is "intermediary" [2]. While in terminology Schramm defines the learning media as a messenger technology that can be utilized for learning purposes [3]. Seels and Glasgow define interactive media as a media delivery system that presents video recording material with computer control to audiences that not only hears and views, but also provides an active response that determines the speed and sequence of the presentation [4]. Media has a function to generate students motivation and interest, and help students improve their understanding, presenting data in an interesting and reliable way, facilitating interpreting data and compacting information. The position of media in learning can be seen in Figure 1.
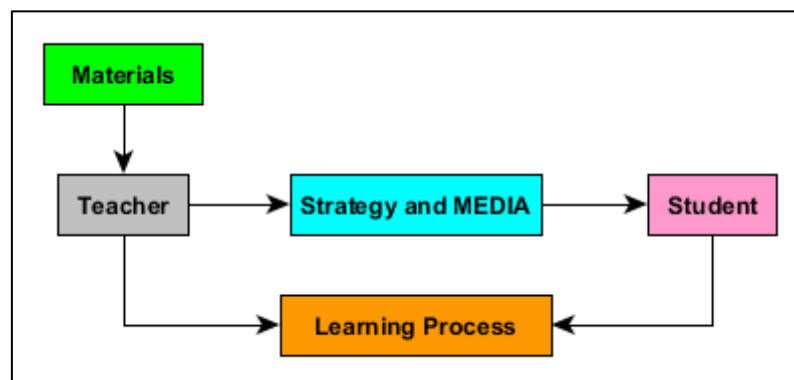
Figure 1. Position of Media.

Figure 1 shows the position of media in the learning process. In the learning process between materials, teacher, strategy and media, and student becomes a mutual sequence that affect each other according to their position. The teacher are positioned as message distributor and student as recipient of the message. While the media is located as an intermediary or medium in learning. But the selection of appropriate media is strongly influenced by the strategy, approach, method and learning format used by teacher [2]. Integration of media in learning process having some advantages, such as: (a) easy to use, (b) motivating, (c) portable, (d) always available, (e) simple, (f) customized, (g) common, and (h) having a lot of features [5].

2. MELDASH
The product of this research is a valid interactive media on the basic electronics engineering subject in accordance with Kurikulum 2013 syllabus which is named MELDASH. MELDASH contains basic competencies from 1 to 5 in the basic electronic engineering subject. MEDLASH created using Adobe Flash CS 6 and ActionScript 2.0. MELDASH consist of 5 files that each file discusses about each basic competence from 3.1 to 3.5.

The material contained in MELDASH refers to trustworthy books, website, and relevant research result to meet the indicators contained in the basic electronics engineering in Kurikulum 2013 syllabus. MEDLASH interface for each file is similar, only the title, material, exercise, and basic competencies and indicator list is different according to the material being discussed.

On the main screen of MELDASH there are 4 buttons and a logo of UNESA (Unviersitas Negeri Surabaya) as the university identity, the first is the material button to show the discussed material, the second is the exercise buton to show the exercise questions, the third is the competencies button to show the basic competencies and indicators from the discussed material, and the fourth is an exit button to close the media. On the main screen will be automatically shown the title of the discussed

material. Next and Previous button on the bottom right is used to navigate through the active page. The main screen of MELDASH is shown in Figure 2.

Figure 2. MELDASH main screen.

The discussed material can be found by pressing the first button, a book icon (⬛). To show an exercise question user can use exercise button, question icon (⬤). The user will be shown a question per page and must answer the following question in order to continue to the next question. After all questions is answered, the user will get the result how many their correct answer and incorrect answer. In addition, the user will be shown which number is answered correctly and which is answered incorrectly. Figure 3 shown the exercise questions main screen which its first question will be different for each material.

Figure 3. MELDASH exercise question screen.

3. Method

Research & Development (R & D) is used in the development of of the product in this research. R & D in educational research is defined as the process used to develop and validate educational [6]. R & D has 10 steps, but in this research will be limited and modified into 7 steps with analysis and report as the last step, those are: (a) potency and problem, (b) data collecting, (c) product design, (d) design validation, (e) design revision, (f) field test, and (g) analysis and report.

Potency and problem is a step to obtain the potential that already exist on the studied object and find the problem contained in this study. Data collecting step is done for the collecting various information used as learning media planning materials that are expected to solve the existing problem. Product design is used to get an overview of the MELDASH developing. Design validation stage is a stage to assess whether the product has been valid enough to be said as a good learning media and get the consideration advice of revision of the developed learning media. Based on the advice from the validator, MELDASH is revised, this is the design revision step. Field test conducted to get the needed data, MELDASH tested on X-TEI 1 and X-TEI 2 students in SMK Negeri 1 Driyorejo-Gresik. The last steps is analysis and reporting the result and the finding of this study scientifically.

The steps taken in the implementation of this research are: (a) make a permission letter from the Faculty of Engineering UNESA, (b) the permission letter was sent to SMK Negeri 1 Driyorejo – Gresik and accepted by Mr Rafli, (c) the school gives permission to conduct a needs assessment, (d) conducting needs assessment verbally to the basic electronic engineering teacher, (e) a reply letter stating that SMK Negeri 1 Driyorejo – Gresik is willing to be used as a research site given, (f) based on preliminary study results that have been previously made compiled research proposal entitled "Interactive learning media based on flash for basic electronic engineering development for SMK Negeri 1 Driyorejo – Gresik", (g) making a sample of interactive learning media in order to conduct proposal seminar, (h) making complete learning media to be used during research, (i) validation of interactive media product by validator who is competent in his field, and (j) analysing and final reporting after the research process at field is finished.

Data collection is done by giving responses in four scale criterion. The following scoring criteria are shown in Table 1.

Table 1. Scoring Criterion.

Category	Score	Percentage (%)
Very Good	4	76 – 100
Good	3	51 – 75
Bad	2	26 – 50
Very Bad	1	0 – 25

Table 1 shows the criteria of the four rating scales: (a) very good, (b) good, (c) bad, and (d) very bad. The scoring criterion is given to validators who will validate the media and students who will fill the questionnaire. The total answer is determined by multiplying the number of respondents by the weight of the value. The formula used is [7]

$$
\begin{array}{ll}
\text{Very good (n validator)} & \text{n x 4} \\
\text{Good (n validator)} & \text{n x 3} \\
\text{Bad (n validator)} & \text{n x 2} \\
\text{Very bad (n validator)} & \underline{\text{n x 1}} \;\; + \\
\sum \text{Answer (SoR)} & =
\end{array} \tag{1}
$$

After doing the sum of respondent answers, the next step is to determine the percentage of validation score by a using formula where RPR is a respondent percentage respond, SoR is the sum of respondent respond and SoM is amaximum score of respondent respond [7].

$$RPR = \frac{SoR}{SoM} \times 100\%$$

(2)

4. Result

There are two results found in this study, first is the media validity and second is a student response toward the developed media. Media validity will be separated into two phases, first validation and second validation.

4.1. First Validation

First validation involving only two subject teachers at SMK Negeri 1 Driyorejo – Gresik. The validation result given by the teacher is shown in Figure 4.
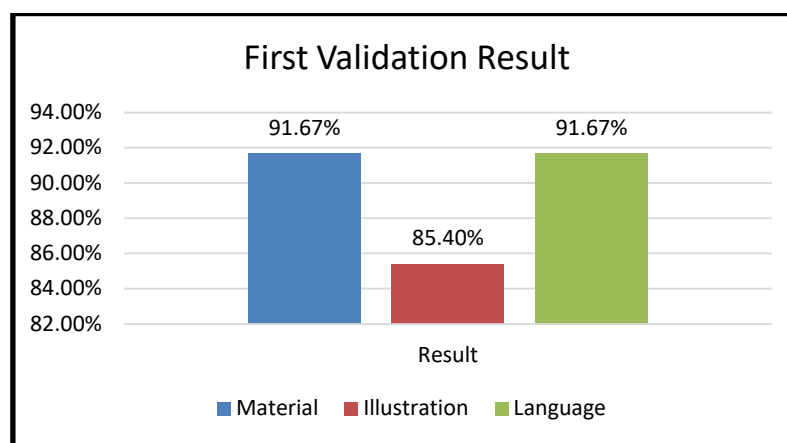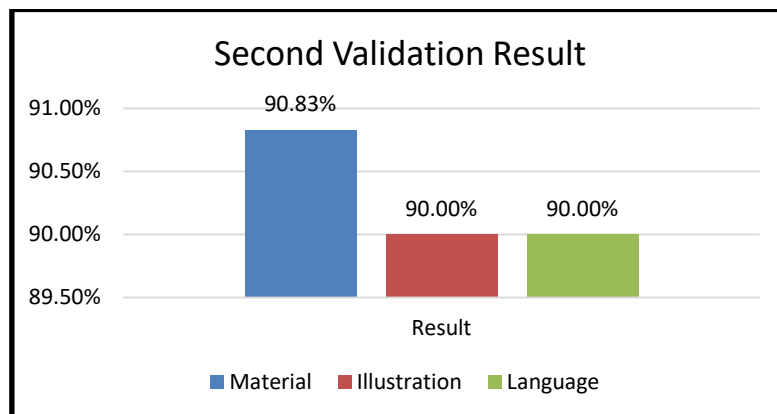

Figure 4. First validation result graphic.

From the result of first validation shown in Figure 4 hence can be obtained percentage of validity of interactive learning media as follows: material aspect 91,67%, media illustration 85,40%, and language aspect 91,67%. From these three aspects can be taken an average value of validity 89,76%. Based on the assessment criteria table can be categorized as "Very Valid".

Several suggestions for MELDASH is given by the validators such as: (a) revision in materials, image, and animation; and (2) add the physical components. After getting the suggestion for revision, MELDASH is revised based on their suggestions.

4.2. Second Validation

Second Validation involves two subject teachers at SMK Negeri 1 Driyorejo – Gresik and three lecturers from UNESA educational electronic engineering major which are considered to have competencies in media validation. The validation result given by the validators shown in Figure 5.

Figure 5. Second validation result graphic.

From the result of first validation shown in Figure 5 hence can be obtained percentage of validity of interactive learning media as follows: material aspect 90,83%, media illustration 90%, and language aspect 90%. From these three aspects can be taken an average value of validity 90,28%. Based on the assessment criteria table can be categorized as "Very Valid".

A suggestion for MELDASH is given by the validators on this second validation is addition of materials. After getting the suggestion for revision, MELDASH is revised based on their suggestions.

4.3. Student Response

Student responses obtained at the field test stage. Field test is conducted in five meetings for both X-TEI 1 and X-TEI 2. The students open their laptop while the teacher is projecting the MEDIA using a screen projector to show the student how they operate MELDASH. After that the students will try MELDASH by themselves. After going through 5 meetings, then the questionnaire of student responses is distributed to the students. The function of this questionnaire is to determine level of the student's interest to MELDASH. According to the questionnaire that has been filled by students, MELDASH got the response as shown in Figure 6.
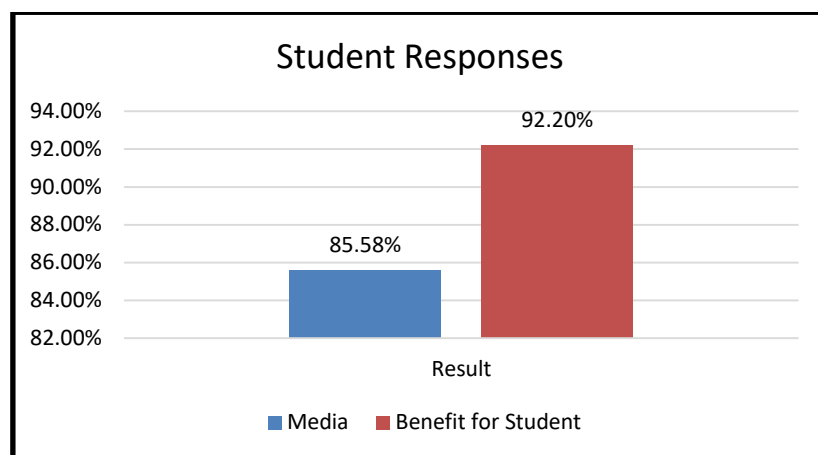
Figure 6. Sutedent responses graphic.

Based on the Figure 6, found that the feasibility of MELDASH from media aspect is 85,58% and from benefit for student aspect is 92,20%. From both aspects can be taken the average value for student response from MELDASH equal to 88,89%. The average value of student responses can be categorized as "Very Eligible" to be used in the learning process.

5. Conclusions

Interactive learning media based on flash for basic electronic engineering has ben designed, built, and tested. MELDASH got 90,83% score for its validity, in other words can be said that MELDASH is valid to be used in the teaching process. Student response toward MELDASH is positive indicated by its score, 88,89%. MELDASH is very interesting for students to help them learn basic electronic engineering in 10th grade in vocational high school.

References
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