

## Development of Android-Based Learning Media on Workshop Working Lessons and Engineering Images

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### INTISARI

Penelitian ini bertujuan untuk perancangan media pembelajaran berbasis android memakai aplikasi *Web Mit App Inventor* dalam mata pelajaran kerja bengkel dan gambar teknik kelas x teknik elektronika industri smk negeri 1 sumatera barat. Jenis penelitian ini merupakan memakai metode Richey and Klein yang adalah pengembangan Design and Development (D&D). Richey and Klein menyatakan fokus pada perancangan, produksi, dan evaluasi. Jenis data pada penelitian ini yaitu data kuantitatif dan data kualitatif. Instrumen penelitian berupa angket yang dipakai buat memperoleh data mengenai taraf kelayakan dan kepraktisan media pembelajaran. Angket ini diisi dua orang pakar materi, dua orang pakar media, dan respon anak didik secara uji terbatas. Hasil penelitian ini merupakan penilaian & pengguna kelayakan media pembelajaran menurut kedua pakar materi menggunakan homogen-homogen 95,45% pakar media menggunakan homogen-homogen 86,15% kategori "Sangat Valid". Evaluasi dan pengguna menurut respon anak didik secara uji terbatas menggunakan homogen-homogen merupakan 86% kategori "Sangat Praktis".

**Kata Kunci :** *Media Pembelajaran berbasis android, Design and Development (D&D), Kerja Bengkel dan Gambar Teknik.*

### ABSTRACT

This study aims to design android-based learning media using the Mit App Inventor Web application in workshop work subjects and engineering drawings for class X industrial electronics engineering at SMA Negeri 1 West Sumatra. This type of research is using the Richey and Klein method which is the development of Design and Development (D&D). Richey and Klein stated a focus on design, production, and evaluation. The types of data in this study are quantitative data and qualitative data. The research instrument in the form of a questionnaire used to obtain data regarding the level of feasibility and practicality of learning media. This questionnaire was filled with two material experts, two media experts, and students' responses on a limited test basis. The results of this study are an assessment & user of the feasibility of learning media according to the two material experts using homogeneous 95.45% media experts using homogeneous 86.15% category "Very Valid". Evaluation and users according to students' responses in a limited test using homogeneity are 86.27% of the "Very Practical" category.

**Keywords :** *Android-based Learning Media, Design and Development (D&D), Workshop Work and Technical Drawing.*



### INTRODUCTION

Education is an internal part of development [1]. The learning process during the COVID-19 pandemic, according to the practice of educational field practice in July-December 2020, the

implementation of learning by sharing learning materials through the WhatsApp application created a lack of interest in learning activities [2], one of which was class X industrial electronics engineering. The material that has been given in the

WhatsApp group is not saved, and students ask for the material back when they want to do the assigned task.

Based on the results of interviews with researchers with teachers of workshop work subjects and technical drawings at SMK Negeri 1 West Sumatra, namely Mr. Elborsi, S.Pd through the Zoom application, that learning methods during the Covid-19 [3] period made students' interest and motivation to study very lacking, because the Workshop Work learning materials and Technical Drawing are subjects that require students to have practical work. To replace the practicum material, the teacher replaces by sending learning materials in the WhatsApp group and then providing the exercises contained in the material.

App Inventor is a very good program created by Google and now developed by MIT. This program can be used to create and design Android applications based on Web pages and Java interfaces [4].

The existence of computers, printers, infocus, scanners and various other technological tools is felt to help a lot in the field of education in Indonesia [5].

Therefore, it takes a more interesting learning creation using technology to make it easier for students to take material without asking the teacher again. Making this android-based learning media can train students to learn more independently and can work on increasing knowledge by doing the exercises contained in the application.

According to Rahmantiwi [6] educational changes create innovations in education intending to improve the quality of education.

Information technology, like innovation, is a necessity for education. So the author makes learning media using the mit app inventor web application.

## METHOD

The development method used in this study is the Richey and Klein method which is a Design and Development (D&D) development model Sugiyono [7]. Produce an android-based learning media for class X TEI SMK Negeri 1 West Sumatra. Richey and Klein stated that the emphasis on design and development research is analysis from start to finish, which includes planning, production and evaluation [8].

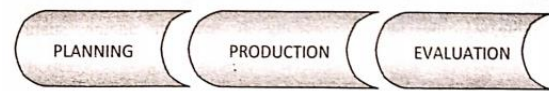


Figure 1. Richey and Klein method

### 1. Planning

The process of designing learning media development using the mit app inventor web application uses two analyzes and flowcharts, as follows :

#### a. Mit App Inventor Web Application Needs Analysis

In this needs analysis, it is the stage of analyzing the needs for designing the Mit App Inventor Web Application [9].

- 1) Functional requirements analysis regarding the features presented in the Mit App Inventor Web Application.
- 2) Analysis of non-functional requirements in making the Mit App Inventor Web application, which includes: Hardware and software.

#### b. Material Analysis

The material presented in this android application is sourced from books and the internet that have been compiled in advance, can be adapted to the Basic Competencies (KD) in SMK Negeri 1 West Sumatra

#### c. Flow chart

The flowchart of learning media using the mit app inventor web application describes the form of the process of running android-based learning media [10].

### 2. Production

This stage is the product design stage based on the visual description at the design stage, namely the main menu, RPS page, material page, practice questions page, quiz page, profile page, and instructions page. as follows,

- a. Main Menu, which is the main menu page that contains the main menu display that exists when the Inventor web application is run. There are six menu buttons, namely: RPS, material, practice questions, quizzes, profiles, instructions and exit button from the application. The seven buttons when clicked will move to the desired page .
- b. The RPS page, which is the page that appears when the user clicks the RPS button, a page containing the syllabus and RPP buttons will appear for one semester.

- c. Material Page, namely on this page is the page that appears when the user clicks the material button. Then the material will appear in 16 meetings including the Mid-Semester Examination and the Final Semester Examination.
- d. Question Practice page, namely on this page there is a menu which contains practice questions for 14 meetings, because for meetings 7 and 16 are tests that are already in the material.
- e. Quiz page, this page displays multiple choice questions to train students before studying.
- f. Profile page, this page displays the profiles of researchers and supervisors.
- g. Instructions page, that is, this page contains instructions for the function of using the buttons on the KBGT application menu.
- h. Exit i.e. this button works if the user wants to exit the app.

**3. Evaluation**

a. This stage is the feasibility test stage, the feasibility test of learning media using the mit app inventor web application is carried out on the validity test by media experts and material experts [11].

Validator 1 as a material expert and Validator 2 as a media expert who is a teacher of workshop work subjects and technical drawings at SMK Negeri 1 West Sumatra. Meanwhile, two validators of learning media from a lecturer in the department of electronics at the Padang State University, namely Validator 1 as a material expert and Validator 2 as a media expert.

The data that will be obtained in this study is in the form of a questionnaire and then processed by giving the value of validity and practicality with the formula [12] :

$$NP = \frac{R}{SM} \times 100 \text{ (1)}$$

Information :

NP = percent value that wanted or expected

R = raw score that obtained

SM = Maximum score ideal

100 = Fixed number

(Purwanto, 2013) [4]

Provide an assessment of the validity of this learning media with the following criteria.

[13] with modification

This stage is a practical test to students with a limited test. The practicality test can be done by distributing it to class x industrial electronics engineering students on a limited basis.

Table 1. Category of Learning Media Validation

No	Achievement Rate (%)	Category
1	0%-20%	Very Invalid
2	21%-40%	Invalid
3	41%-60%	Quite Valid
4	61%-80%	Valid
5	81%-100%	Very Valid

Table 2. Practical criteria for media

No	Achievement Rate (%)	Category
1	86% - 100%	Very Practical
2	76% - 85%	Practical
3	60% - 75%	Quite Practical
4	55% - 59%	Less Practical
5	0% - 54%	Impractical

(Purwanto, 2013) [4] with modification

**RESULTS AND DISCUSSION**

Questionnaire data was collected in July 2020 at schools and on campus. Richey and Klein's development method states that the emphasis according to design and development research is analysis from beginning to end, which includes design (planning), production (production) and evaluation [14].

**1. Planning**

**a. Mit App Inventor Web Application Needs Analysis**

In this needs analysis, it is the stage of analyzing the needs for designing the Mit App Inventor Web Application :

**1) Functional requirements analysis**

regarding the features presented in the Mit App Inventor Web Application, among others: presentation of menus to select the desired material page, compiling an outline of application content by looking at the syllabus and basic competencies to be used, presentation of pages, presentation of material.

**2) Analysis of non-functional requirements**

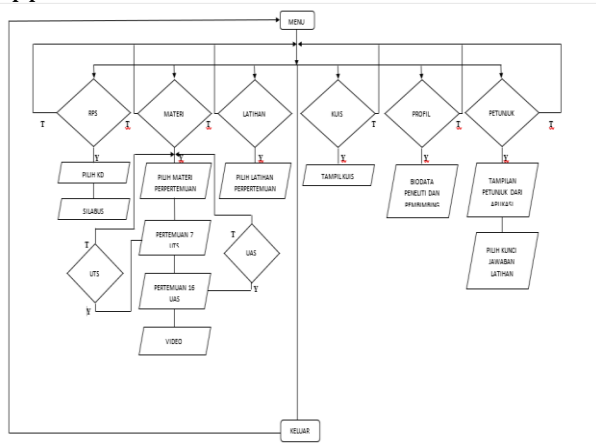
In making the Web Mit App Inventor application, it has various sets of equipment, namely hardware used for making Android-based learning media such as laptops and smartphones. Application design software such as: Mit

a. Material Analysis

The material in the subject of workshop work and drawings x industrial electronics engineering refers to the 2013 curriculum at SMK Negeri 1 West Sumatra.

b. Flow chart

The following is an image of the learning media flowchart using the mitt app inventor web application :



Gambar 2. Flowchart

2. Production

This stage is the product design stage based on the visual description at the design stage, namely the main menu, RPS page, material page, practice questions page, quiz page, profile page, and instructions page.

On the main menu display there are seven buttons, namely: RPS, materials, practice questions, quizzes, profiles, instructions, and exit buttons. The seven buttons when clicked will move to the desired page. It can be seen in Figure 3 below:



Figure 3. Initial view of the main menu

App Inventor Web Application, CorelDraw X7, Freepik, and Pinterest

One of them is the material page button which contains Workshop Work material and Technical Drawings for one semester in odd semesters. It can be seen in Figure 4 below :

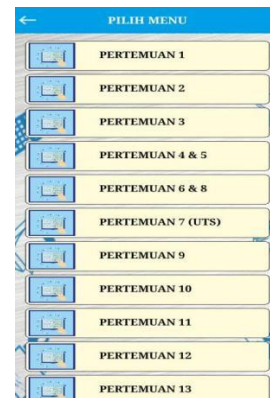


Figure 4. One of the material pages is on the material button

The meeting button 1 is pressed, the material for KD 3.1 Occupational Safety and Health (K3) based on OSHA will appear. It can be seen in Figure 5 below :



Figure 5. Occupational safety and health (K3) materials based on osha

3. Evaluation

a. The feasibility test stage for android-based learning media is the material expert and the material expert. The evaluation of the questionnaire based on material experts can be seen in table 3 below.

Table 3. Validator of material expert questionnaire

No	Indicator	V1	V2
1.	Completeness of the material presented	5	5
2.	The breadth of the material described	5	5
3.	Depth of material presented	5	5
4.	Accuracy of concepts and definitions when delivering material	5	5
5.	The accuracy of the information and data presented on the material	5	5
6.	The strength of the model and the problems presented	4	4
7.	Accuracy of drawings, diagrams, and illustrations in the material	4	4
8.	The accuracy of the words used in sync with the material Encourages curiosity	5	4
9.	Encourage curiosity	5	5
10.	Increase students' interest in learning	5	5
11.	Creating the ability to ask students	5	5
<b>total</b>		53	52
<b>Validation result</b>		96,4	94,5
<b>percent value</b>		95,45	
<b>Category</b>		Very valid	

(Rahmantiwi, 2012)[5] with modification

Based on table 3, the assessment that has been processed by researchers produces the value of validator 1 Mr. Elborsi, S.Pd, is 96.4% and validator 2 is Mr. Drs. Hanesman, M.M, is 94.5% with an average percentage of 95.45%, the percentage is 95.45% in the "Very Valid" category.

The material expert's assessment of each validator is shown in Figure 6. in the following graphic form:

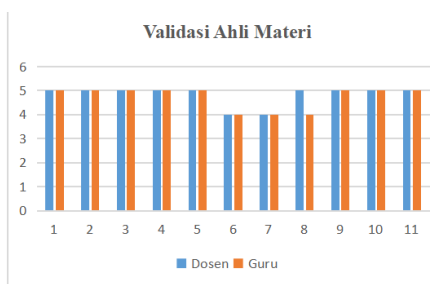


Figure 6. Graph of Material Expert Validation Results

For the assessment of the questionnaire from media experts, it can be seen in table 4 below.

Table 4. Media expert questionnaire validators

No	Indicator	V1	V2
1.	Icons or buttons that make it easier for users to use media	4	4
2.	Presentation of the initial display that makes it easier to determine the next activity	4	4
3.	Clarity of dishes and materials on the media	5	5
4.	The accuracy of the selection of images and the proportions of the images presented	4	5
5.	Color selection	4	5
6.	Ease and simplicity in operation	4	4
7.	Ease of maintenance or media management	5	4
8.	Media is easy to use anytime and anywhere	4	5
9.	The interface on android-based learning media has a good layout	4	5
10.	Android-based learning media display design according to user level	4	5
11.	Precise maintenance of color, typeface and font size	4	4
12.	Android-based learning media can be run on all versions of android	4	4
13.	Android-based learning media can run on all screen resolutions	4	4
<b>total</b>		54	58
<b>Validation result</b>		86,15	89,2
<b>percent value</b>		87,68	
<b>Category</b>		Very valid	

[15] dengan modifikasi

The assessment that has been processed by the researchers produces a value for validator 1 Mr. Fadhli Ranuharja, S.Pd, M.Pd.T is 86.15% and validator 2 Mr. Ridcel Yandres, S.Pd, M.Pd.T is 89.2% media learning with an average percentage of 87.68% with the category "Very Valid".

The media expert's assessment of each validator is shown in Figure 7. in the following graphic form :

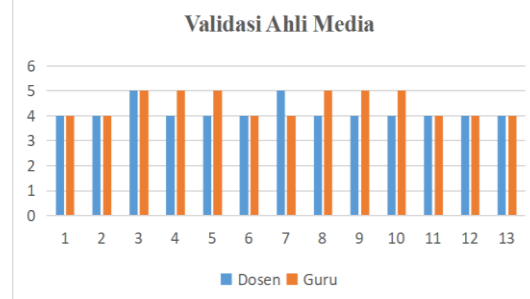


Figure 7. Graph of Material Expert Validation Results

- a. This stage is a practical test to students with a limited test. The practicality test can be carried out by distributing to students of class X TEI SMK

Negeri 1 West Sumatra in a limited way, as many as 13 people. It can be seen in table 5 below.

Table 5. Practicality on student responses

No	Student name (initials)	Student response results
1	HA	84,2
2	IS	85
3	MAR	86,7
4	SM	90
5	IG	85,8
6	RSVU	86,7
7	HF	83,3
8	MI	85
9	EDA	83,3
10	AHS	85,8
11	AKS	90
12	ND	88,3
13	MN	87,5
<b>total</b>		1.121,6
<b>average</b>		<b>86,27</b>
<b>Category</b>		<b>Very practical</b>

(Rahmantiwi, 2012)[5] with modification

The assessment that has been processed by researchers produces a value for the practicality of learning media with a percentage of 86.27% in the "Very Practical" category.

## CONCLUSION

Research and development of android-based learning media using the Web Mit App Inventor application concludes :

1. This research and development produces a product, namely an Android-based learning media using the Mit App Inventor Web application which refers to a research and development design using the Richey and Klein method which is a Design and Development (D&D) development model.
2. Based on a material expert validation questionnaire regarding the feasibility of android-based learning media using the Mit App Inventor Web application with a percentage value of material experts 95.45% and material experts 87.68% with an average percentage of 91.56% with the category "Very Valid".
3. Based on the student response questionnaire regarding the practicality of learning media based on Android using the Mit App Inventor Web application with the percentage of practicality of learning media is 86.27% with the category "Very Practical".

## SUGGESTION

The results of the research that has been done can be given some suggestions for the development of android-based learning media using the Mit App Inventor Web application, as follows :

1. Android-based learning media that have been developed still need to be optimized again because in development using the Mit App Inventor Web application there are still many weaknesses in making learning media.
2. Mit app inventor was made by Google and is now being developed. MIT has limitations in manufacturing, the screen on mit app inventor can only be 10 screens, more than 10 mit app inventor can't download applications, then for a maximum size of 30 MB if more you can't download applications.
3. Media that has been created with the Web Mit App Inventor application if too many screens make the media application process difficult and in making media requires an internet network. The media display or layout of the created media does not match the designed in the Mit App Inventor Web application, therefore it is necessary to repeatedly save the application to adjust the media layout.

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