

## Development of Android-Based Interactive Learning Media in a Surveying Quantity Course

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### ABSTRACT

*This study discusses the design and development of interactive Android-based learning media for the quantity surveying course for students in the field of building engineering education. Today's technological advancements necessitate innovation in educational media so that learning can be adapted to digital advancements and made more engaging in order for students to independently study the topic and comprehend the instructional medium. The purpose of this study is to evaluate the validity and practicality of interactive learning media based on Android in the quantitative surveying course. The DDD-E development model is used in this project's research and development (R&D) approach. Three experts validated the product, and 58 building engineering education students who did the surveying quantity course during the semester of January–June 2023 practiced their skills. According to the evaluation of interactive learning media based on Android that was done, the findings of the evaluation by material specialists were reached at 0.88 with a high validity category. The assessment of media experts obtained a score of 0.8 in the high validity category. The practicality assessment received a score of 0.80 in the high practicality category. Based on the results of the study, it can be concluded that the interactive learning media in the surveying quantity course made with the DDD-E research model can be said to be valid and practical with high categories and can be used in learning.*

**Keywords:** Learning Media; Interactive; Android; Surveying Quantity.

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### INTRODUCTION

Education is one of the human needs because, through education, humans can gain knowledge and skills [1]. The existence of human education can also improve the quality of reliable human resources, which can lead a country in a better direction. In the world of education, technological developments play an important role in the learning process. Information and communication technology is needed to increase the effectiveness of learning and improve the quality of education. According to Hujai, learning in schools started to change as information technology grew, which resulted in changes and shifts in the way we view education [2]. During the learning process, educators are required to create new learning media innovations by utilizing technology in addition to conventional media like textbooks or teaching materials so that students can easily understand the material.

Learning media are any tools that may be used to communicate ideas through message channels and can arouse students' interests and motivation, promoting the development of a learning

process to supplement students existing knowledge [3]. Learning media is a tool that supports the learning process because it uses media to channel messages in an acceptable, amusing, and relevant way to pique receivers' attention [4]. According to opinion [5], learning media is a tool that can aid the learning process by making the meaning of the message given clearer and enabling the achievement of learning objectives effectively and efficiently. This indicates that the availability of learning resources can make learning easier. Because it can make students more interested in studying, learning media serves as a learning support for educators.

According to the findings of online interviews with 15 students from the Civil Engineering Department performed using a Google Form, 67% of students reported that they were still having trouble understanding the Surveying Quantity material in independent learning. The less engaging and diverse learning media utilized in the learning process are one of the reasons why pupils struggle to understand. Some students believe that innovation in learning materials is necessary to make learning more engaging and capable of adapting to technological advancements in order for students to independently study the topic and comprehend the instructional medium.

Making interactive learning media with the aid of communication technology, specifically Android, is one alternative learning media that may be employed in the learning process to get over these issues. Based on data from Indonesia's Market Share in the February–June 2023 period, it can be seen that Android users are far more than iOS users, where Android users reach 88.22% and iOS only 11.65%, and the rest are other mobile operating systems. Android is an operating system and programming platform for smartphones and other mobile devices. The application of Android in education is shown by the existence of educational applications such as the Ruang Guru application and Quipper, but the use of smartphones as a learning medium in formal education is still rare [6]. This is due to the creation of applications that are complex and take a relatively long time, so teachers tend to use conventional learning media such as textbooks and Microsoft PowerPoint.

Conventional media tends to only be used by students to learn in class because it is not mobile, like an Android application. Students are less engaged in the learning process when learning media are simply given to them as files via WhatsApp and Google Classroom, which are less effective in grabbing their attention [7]. Students who use Android to learn are still few, and the rest use it for social media and playing games [8]. Indirectly, it explains that students need learning media that can be used by themselves anywhere and anytime so that it can cause interaction between students and their learning media. Interactive means mutual influence, where there is a reciprocal relationship between the user and the program, where the user responds to the request or display of the program, and then the program presents the information provided [9]. In line with the statement [10], interactive multimedia can be controlled by its users so as to provide a direct experience for students. The existence of Android-based interactive learning media allows students to learn independently anywhere and anytime, and when students do not understand the explanation of the material in class, they can repeat the material at home.

Making interactive learning resources for Android using PowerPoint may result in creating learning resources in the form of applications, which are subsequently refined using the Ispring Suite 10 software. According to [11], Microsoft PowerPoint is used to aid in the planning and construction of successful presentations and display slides in a visually appealing and expert manner by adding various kinds of special effects. The created instructional media can later be

used on Android devices with the help of APK Builder. Presentation files can be converted from HTML to an application format (apk) using Ispring Suite 10.

## METHOD

Research and development (R&D) research is the method used in this research. This method is used to create new products, enhance old ones, and evaluate the viability of the end results. The DDD-E development model, which consists of the four steps of decide, design, develop, and evaluate, is used in this research [12].

The semester from January to June 2023 saw the completion of this research at the FT UNP's Department of Civil Engineering. Questionnaires are employed as a research tool in this study. Validation questionnaires for learning media products and practicality questionnaires were both used in the research. A product validation questionnaire was supplied to validators (1 material validator, 3 media validators), and 58 students of the Building Engineering Education Study Program, Department of Civil Engineering, received a practicality questionnaire. The formula for data analysis is as follows:

### a. Validation Test

The validation questionnaire data obtained from validators is processed using the following formula [13]:

$$V = \frac{\sum s}{n(c-1)} \quad (1)$$

Note:

V = appraiser agreement index

s = The score of each rater is reduced by the lowest score in the category used ( $s = r - I_o$ ).

r = Assessor's Choice Category Score

$I_o$  = lowest score in the scoring category.

n = number of appraisers

c = the number of categories that the rater chooses.

The evaluation findings are grouped based on the amount of validity after receiving feedback from the validator, as shown in Table 1 [14].

Table 1. Validation Categories

Average Score	Level of Validity
$V < 0,4$	Low
$0,4 < V < 0,8$	Medium
$V > 0,8$	High

### b. Practicality Test

The following formula was used to process the data from the respondents' practicality questionnaire [13]:

$$V = \frac{\sum s}{n(c-1)} \quad (2)$$

Information:

V = appraiser agreement index

s = The score of each rater is reduced by the lowest score in the category used ( $s = r -$

- Io).  
 $r$  = Assessor's Choice Category Score  
 $Io$  = lowest score in the scoring category.  
 $n$  = number of appraisers  
 $c$  = the number of categories that the rater chooses.

According to the level of practicality, the assessment results are categorized after receiving student evaluations, as shown in Table 2 [14].

Table 2. Categories Practicality

Average Score	Level of Practicality
$V < 0,4$	Low
$0,4 < V < 0,8$	Medium
$V > 0,8$	High

## RESULTS AND DISCUSSION

Making this Android-based interactive learning media uses the DDD-E model with the following stages:

### a. Decide

The decision stage serves as the starting point for the creation of learning media products. The following are the steps that were taken:

- 1) The creation of learning media products begins with the decision-making phase. The actions that were taken were as follows: establishing learning objectives that are tailored to the Surveying Quantity course's semester learning plan (RPS). The assembled learning objectives are examined by choosing the best media in order to produce media development outcomes that can best aid students in achieving their learning objectives. All of the course material for one semester is covered by the learning media utilized in this surveying quantity course.
- 2) Deciding on the media's theme and reach. The research resource utilized for this study was an Android-based interactive learning resource made with the aid of Microsoft PowerPoint software, Ispring Suite 10, and Apk Builder. The employment of this software results in interactive media goods in the form of Quantity Surveying applications, which can then be downloaded and installed on smartphones.
- 3) Identify the media access. This program, which is an Android-based interactive learning resource, may be downloaded and used immediately from a smartphone and is shared via WhatsApp.
- 4) Establishing research objectives for Padang State University's Building Engineering Education study program students enrolled in the Surveying Quantity course during the semester of January–June 2023.

### b. Design

- 1) Create a flowchart. Design a flowchart. In order to make it simpler for users to use this interactive learning media in the future, researchers created flowcharts that illustrate the order and structure of learning media. Storyboards will be generated with the help of the flowchart as a guide.
- 2) Design the display used in interactive learning media. This display design includes the home view, main menu display, material display, and user instructions.

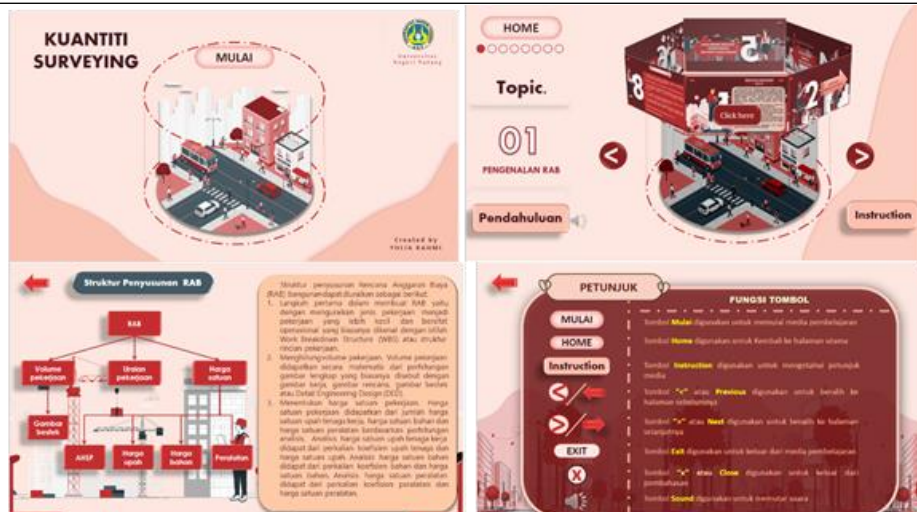


Figure 1. Media Display

- 3) Create a storyboard that is used to describe the look and layout of the media. Storyboards are used as guidelines in the process of making learning media so that the results are more structured.
- c. Develop
- This stage begins with collecting media components such as backgrounds, graphics, images, text, and animations that are in accordance with the learning material created. After that, the materials, images, backgrounds, and concepts that have been prepared are arranged according to the previously designed concepts. After the preparation is complete, the materials are arranged according to the design of the storyboard using Microsoft PowerPoint software. Then corrections and edits are made to the media to avoid errors and ensure the resulting media can be used smoothly. Furthermore, media that has been created in Microsoft PowerPoint is exported in HTML form using Ispring Suite 10 software. Then the HTML file is exported again into apk format with the help of Apk Builder software, and later this apk file can be installed on an Android smartphone.
- d. Evaluate
- The evaluation stage is not only carried out on the final product but also at every stage of development. Thus, the evaluation is carried out at the decision, design, and development stages. Before conducting the evaluation, a validation test was carried out on the questionnaire instrument used.

An evaluation of the topic's and the media's accuracy is conducted at the decision-making stage; the results are shown in Table 3. The evaluation of the design phase is based on the flowcharts and storyboards that will serve as guidance for producing media. During the development phase, interactive learning media products developed in accordance with the design are evaluated; the assessment outcomes are shown in Table 4. In the last stage, a media practicality test was conducted by giving a response questionnaire to students enrolled in the Quantity Surveying program at the Department of Civil Engineering at Padang State University for the January–June 2023 semester. Table 5 contains the assessment's findings.

Table 3. Material Validation Results

No	Assessment Aspect	Number of Items	Number of Scores	V	Category
1	RPS Compliance	4	16	1,00	High
2	Precision and accuracy of the material	7	24	0,81	High
3	Learning support materials	2	7	0,83	High
Grand Total		13	47	0,88	High

According to the data provided in Table 3, the element of material assessment in interactive learning media receives a score of 0.88 and is classified as having high validity.

Table 4. Product Validation Results

No	Assessment Aspect	Value Validity	Category
1.	Content of cognition	0,89	High
2.	Information presentation	0,78	Medium
3.	Ease of navigation	0,78	Medium
4	Display	0,80	High
5	Overall function	0,80	High
Grand Total		0,81	High

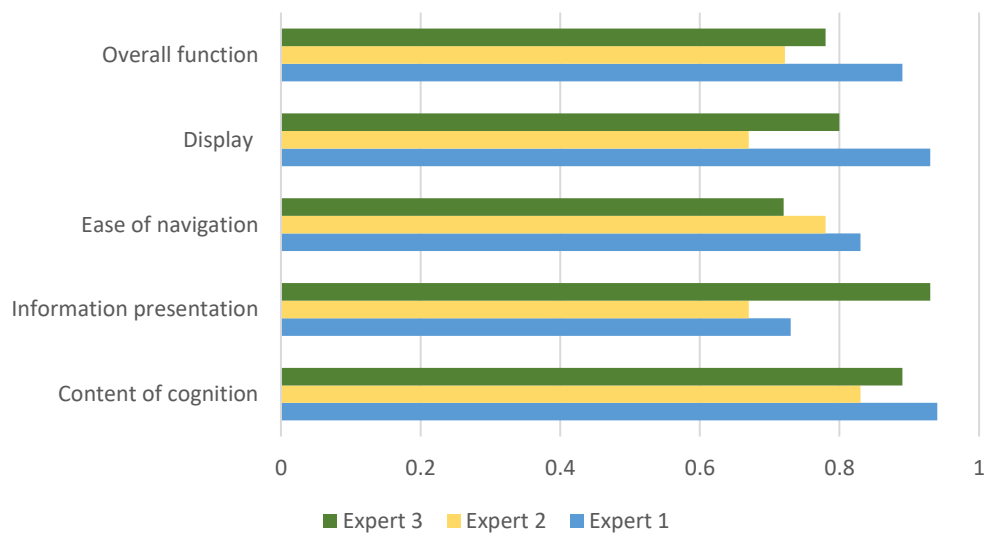


Figure 2. Results of Validity

The information in Table 4 and Figure 2 indicates that the element of material assessment in interactive learning media earns a score of 0.88 and is rated as having high validity.

Table 5. Results of Practicality

No	Assessment Aspect	The Value of Practicality	Category
1	Ease of navigation	0,80	High
2	Display presentation	0,81	High
Grand Total		0,80	High

Based on the data in Table 5. It is clear from the results that the media tested on students in the Building Engineering Education study program had a high level of practicality, with an overall average of 0.80. As a result, it is possible to conclude that interactive learning media based on Android are practical and can be used to support educational activities.

### **Discussion**

The product produced in this study is an Android-based interactive learning media in the Quantity Surveying course. This research aims to create learning media that can support the student learning process in the Quantity Surveying course and support students when studying independently, so that they can make students active and independent, and to measure the validity and practicality of the learning media made.

The validation results on the aspect of material assessment were obtained at 0.88, including the high validity category. The validation results on the media assessment aspect were obtained at 0.81, including the high validity category. Additionally, the student response survey was used to get the findings of the practicality test. According to the practicality test results, the high practicality category received a score of 0.80. Based on the study's findings, it can be argued that the interactive learning materials created using the DDD-E research methodology for the Surveying Quantity course are high-quality, valid, and practical, and they can be used to help students learn.

The findings of this study are consistent with research undertaken [15], which demonstrates that interactive learning media based on Android are recognized as valid in terms of both media and material elements and are recognized as valid for usage as instructional materials. According to research findings [16], android-based interactive learning media is highly practicable to use as a learning medium, increases the media's interest factor, and improves students' comprehension of the subject matter. According to research findings [17], Android-based learning materials are regarded as being both highly practical and very valid in both small group trials and large group trials. Based on research [18], powtoon-based learning media in the Construction Cost Estimation subject is declared valid, practical, and effective to be used as a learning resource for students and can improve student learning outcomes. According to the study, it is possible to employ interactive learning media as a teaching tool with a high level of validity and applicability, which will increase students' enthusiasm for learning the subject matter.

## **CONCLUSION**

The following conclusions can be reached based on the findings of the study that has been done:

- a. Based on the results of a validation process conducted by material and media experts, interactive learning materials in the Quantity Surveying course are approved for usage and are valid. The validity value of 0.88, with a high validity category, was determined by the material expert assessment. According to media experts' evaluations, the validity value is 0.81 and belongs to the high validity category.
- b. The Quantity Surveying course's interactive learning materials were found to be highly practical in terms of their usability and display presentation, with a high level of practicality as measured by student data processing on practicality, which produced a score of 0.8.

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