



Student Responses to Multimedia Applications Android-based Technical Materials Courses in Distance Learning during the COVID-19 Pandemic

Mumu Komaro*, Amay Suherman, Dedi Rohendi, Ana, Iyus Herdiyanto, Ibnu Nur
Akhsan

¹*Mechanical Engineering Education, Indonesian University of Education, Bandung, Indonesia*

*Corresponding author. Email: mumu@upi.edu

ABSTRACT

Engineering materials is the study of material properties and their application to various engineering fields. Most students still have difficulty in understanding abstract, dynamic, and complex subject matter techniques. Students have difficulties in visualization due to invisible and microscopic phenomena in engineering materials. Understanding abstract, dynamic and complex concepts becomes an inhibiting factor in the learning process faced by students. Entering 2020, Corona Virus Disease 19 (COVID-19) is another obstacle factor in the learning process of technical material courses. One of the efforts that can be done is to provide breakthrough learning media with innovative and easy-to-use features, make it easier for students to understand, and support online and distance learning. Android-based multimedia for learning technical materials has been developed and tested before, but this research is more focused on development and application without knowing how the response is given by students. Therefore, this study aims to determine the level of response given by students to the application of Android-based multimedia for engineering materials courses in distance learning during the pandemic. This study used a survey method with 75 DPTM students as participants. The instrument is an Android-based multimedia-related response questionnaire for materials engineering courses. The results showed that the response given by students to multimedia learning was 81.9%, this figure was classified as Very Good as described by the criteria scale. .

Keywords: *Response, Multimedia learning, Technical materials, Android, Distance learning, COVID-19 pandemic.*

1. INTRODUCTION

Engineering material courses are included in the study program expertise courses given to all students of the Department of Mechanical Engineering Education (DPTM) Universitas Pendidikan Indonesia in the first year with a total of two credits. Given to students at the beginning of lectures to make it easier for students to master several advanced skills courses, such as Machine Elements, Metal Fabrication, Welding Engineering, Casting Techniques, and Automotive Chassis and Body.

Engineering materials is the study of material properties and their application to various fields of engineering [1]. In general, in the field of mechanical engineering, materials engineering courses focus on

metal materials [2]. As already explained, engineering materials are a very important subject [3]. Therefore, the ease of material delivery must be considered carefully, to achieve understanding of concepts and material by students [4]. A preliminary study conducted on 32 DPTM students showed that the level of difficulty in the learning process of this engineering material course varied. The most dominant difficulty faced by students is in the subject of phase diagram with 68.8%, as shown in Ability 1 below:

Table 1. The level of difficulty faced by DPTM students in the learning process of the Engineering Material Course

Main Subject	Percentage (%)
Diagram Phase	68.8
Plane Derailment	18.8
Crystal Structure	6.2
Other	6.2

Source: Komaro [17]

Understanding abstract, dynamic and complex concepts becomes an inhibiting factor in the learning process faced by students. Based on the data, the percentage of DPTM students who master essential courses in the materials engineering course is shown in Tmampu 2 as follows:

Table 2. Percentage of DPTM students who master essential courses in the Engineering Materials course.

Do not.	Types of Exams	Percentage of students who master important subjects (%)			
		2014	2015	2016	2017
1	Final Semester Exam	52	57	63	44
2	Midterm Exam	24	25	24	42
	Middle	38	41	43	43

Based on the data in Table 2, in four years, most students still have difficulty in understanding the main subject of abstract, dynamic, and complex engineering material. Students have difficulty in visualizing ations due to invisible and microscopic phenomena in engineering materials.

Entering 2020, Corona Virus Disease 19 (COVID-19) is another obstacle factor in the learning process of technical material courses that began to enter Indonesia last March. This pandemic forced students to implement online distance learning at home and in their respective regions to minimize the transmission of COVID-19[5], [6]. One of the efforts that can be done is to provide breakthrough learning media with innovative and easy-to-use features, make it easier for students to understand, and support Online and distance learning [7]. The application of Android-based multimedia for the learning process is considered the right thing in this regard. Based on IDC data, until September 2013, Android has become the favorite operating system in Indonesia with a market share of 60%, a fact that we already know in general, almost all students have a Smartphone. This is a promising

opportunity to apply learning devices by utilizing Android-based smartphones as learning media.

Smartphones are considered more often used by students than computers, other advantages Smartphones are more ergonomic because they are relatively light, smaller in size than laptops, and always used in daily activities[8], [9]. Android-based multimedia for learning technical materials has been developed and tested by Arifin[10], but this research is more focused on development and application (research experiments in class) without knowing how the responses were given by students. This research will focus on finding out students' responses to multimedia courses for Android-based engineering materials, especially in their application to distance learning in during the COVID-19 pandemic.

2. MATERIALS AND METHODS

This research is a descriptive research with survey methods and uses a quantitative approach. In survey research, researchers ask several people (known as participants) about beliefs, opinions, characteristics of an object and past or present behavior.

The main subject or population of this study is active students of DPTM Universitas Pendidikan Indonesia which amounts to 450 people. The sample used in this study was selected by chance with a total of 75 participants.

In this study, there was one type of instrument used to measure student response. The instrument is created on the basis of a description of indicators related to the research variable. Variable indicators of student response to Android-based multimedia can be described in table 3 as follows:

Table 3. Response indicators.

Variable	Indicator
Media Response	Media Quality
	Audio-Visual Illustration
	Language
	Uses
	Flexibility

The research instrument is made in the form of a questionnaire in Google Form format. This instrument is used to measure the level of student response regarding the application of Android-based multimedia for Engineering Materials courses in distance learning during the COVID-19 pandemic. The questionnaire instrument was in the form of statements related to

Android-based multimedia, which participants responded by providing a checklist.

The assessment method for each statement point on the research instrument uses the Likert scale as in table 4:

Table 4. Assessment Methods.

Shoes	Explanation
5	Very Agree
4	Agree
3	Neutral
2	Disagree
1	Very Disagree

To analyze the data from the questionnaire, his research used percentage descriptive analysis techniques. This method is used to determine the response of DPTM students to the application of multimedia learning based on Android animation applications in distance learning. Here are the steps of the percentage descriptive analysis method:

1. Calculate the value of each aspect or sub variable
2. Recap of grades
3. Calculates percentages
4. Define the level of criteria

To find out the level of these criteria, the scores obtained are analyzed by percentage descriptive analysis by matching them with the criteria as in table 5 below:

Table 5. Percentage criteria.

Percentage	Criterion
81% - 100%	That's great.
61% - 80%	Good
41% - 60%	Neutral
21% - 40%	Bad
0% - 20%	Very bad

3. RESULTS AND DISCUSSION

3.1. Result

The survey was conducted online through Google Form and addressed to 75 participants as respondents. The respondents were a sample of active DPTM students taken by random sampling. Participants are instructed to download, install and use Android-based multimedia for learning technical material courses that have been uploaded on Google Drive.

After participants follow the instructions, participants are allowed to give their opinions through

questionnaire instruments. The results of student responses to Android-based multimedia applications are as follows.

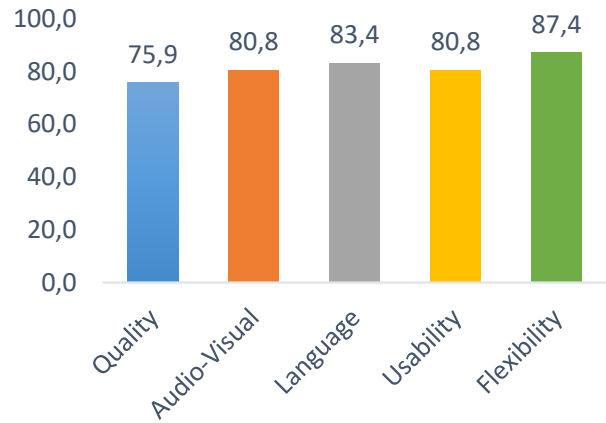


Figure 1 Student Response Results (%).

Based on the survey results in Figure 1 described per indicator, it is known that the student response rate for each indicator is above 61%. By obtaining a value of 75.89% for Quality indicator, 80.8% for Audio-Visual Illustration indicator, 83.37% for Language indicator, 80.8% for Usability indicator, and 87.4% for Flexibility indicator. So it can be concluded that the average response given is 81.9% and classifies as Very Good as described by the criteria scale.

3.2. Discussion

The Android-based multimedia product for engineering materials courses used in this research was developed by Arifin[10], an alumnus of DPTM Universitas Pendidikan Indonesia. This product is suitable for use in the learning process by passing the Media Judgment and Material Judgment tests conducted in 2019. This multimedia has met the requirements of the multimedia system as stated by Munir [11], that the multimedia used in the learning process must have hardware and software aspects. The hardware used is an Android smartphone, while the software used to create this learning multimedia is Unity 3D software.

The advantages of Android-based multimedia are considered worthy of being chosen as learning multimedia for online-based learning and distance learning, as explained by Munir's theory [11] regarding the factors that it must be considered in choosing multimedia learning, including:

1. Multimedia has been able to achieve learning objectives in cognitive and affective aspects.
2. Multimedia has a high use value because it has audio-visual aspects, and is suitable for abstract, dynamic, and complex engineering material courses.

3. Multimedia can be easily installed, and operated by educators and students independently because it is in the Android application format that supports the operating system of most types of smartphones.
4. Multimedia has a high value of flexibility, therefore it is easy to use anywhere and anytime, and is suitable for use for distance learning.

Based on the survey results obtained in the form of Likert scale, it shows that there is a very good response by students to the application of Android-based multimedia, with a percentage of 81.9%. This is due to the quality of multimedia learning. The Flexibility indicator gets the highest number among other indicators, this is because the flexibility of Android-based multimedia learning is very high, it can be installed on Android version 4.1 (old version), relatively light in size (76 MB), and can be accessed without the need for an internet connection.

The percentage of the results of this study (81.9%) is directly proportional to Marsida's research[12] in interactive multimedia research based on Macromedia Flash obtained a student response percentage rate of 84.25%. The Flexibility indicator also showed very good results with a percentage of 89.71%, not far from the results of this study with a percentage of 87.4%. Quality indicators get the lowest response. This is different from Marsida's study[12], the indicator that received the lowest response was the Audio Visual Illustration indicator at 77.43%, while the results in this study were for the lowest indicator is a Quality indicator of 75.89%. However, this result is still in the Good category.

Research conducted by Hidayah[13] on the application of Edmodo-based learning media resulted in student responses that were in the same category as this study, with a percentage of 81%. Other research from Anesia [14] on the application of Android-based Comics learning media, Anantyarata [15] on the application of Autoplay learning media, and Putri [16] on the application of learning media Android-based, also produced student responses that were in the good category with percentages of 80.39%, 88.57%, and 91.67%, respectively. The average results of previous studies were above 80%, this fact supports the results of this study which obtained a percentage of 81.9% and was in the very good category. This shows that the multimedia developed can be accepted and used by students in the online and distance learning process

4. CONCLUSION

This study resulted in the conclusion that students responded very well to the application of Android-based multimedia for Engineering Materials courses in distance learning with a percentage 81,9%. Flexibility is

the indicator that responds best among other indicators with a percentage of 87.4%.

Based on the results, students showed an excellent enthusiastic response. This is because the multimedia learning used is considered to be able to provide solutions to understand Material Engineering courses flexibly, interactively, and easily accessible. Android-based multimedia is very suitable for use as a distance learning medium during a pandemic.

AUTHORS' CONTRIBUTIONS

First Author:

- Design and develop multimedia applications for Android-based engineering materials.
- Conduct surveys and analyses of student needs related to distance learning during the COVID-19 pandemic.
- Design questionnaires and research instruments.
- Collect and analyze data obtained from students. Write important parts of the article, such as introduction, methodology, and findings.

Co-authors:

- Assist in the development of multimedia applications and testing their functionality.
- Assist in surveys and data collection from students.
- Analyze data and contribute to the interpretation of results.
- Provide input and advice in making research instruments.
- Contribute ideas to enrich the content of the article.
- Compile certain parts of the article, such as literature review, discussion, and conclusion.

Explanation of Contribution:

- The lead author is responsible for the design and development of multimedia applications as well as data collection and analysis.
- The first co-author plays a role in application development and data analysis.
- Other co-authors contribute surveys, data collection, and article manuscript preparation.

Communication Role:

- The lead author is responsible for coordination between authors and ensuring the integrity of each author's contribution to the study.
- Communication is carried out through regular meetings, online discussions, and emails between authors to discuss research progress, data analysis, and manuscript preparation and editing.

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