

## Mobile application-based media learning and its' effect on students' learning motivation

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### ABSTRACT

Online learning is a solution used during the COVID 19 pandemic. This study aimed to determine the conditions of learning during the pandemic and the development of mobile application-based learning media. This was a research and development (R&D) in the context of developing mobile application-based learning media. The results of the development of learning media by researchers indicate that experts and students have positive opinions about this cellular application-based learning media. All experts from media experts, materials experts and expert practitioners stated that this media is "very worthy". The results of the perception questionnaire of 126 respondents also rated this media "very worthy" with a percentage value of 86.30%. In addition, the post-test revealed that learning media based on mobile applications is proven to be effective in increasing students' learning motivation.

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## 1. INTRODUCTION

COVID-19 is indeed a big problem in various aspects of life, not only in the health and medical sector, but also in the economic, social, political, and even education sectors. The latest report from the international association of universities and united nations educational, scientific and cultural organization (UNESCO), as many as 1.5 billion students and even more in 185 countries have had their learning disrupted due to university closures due to COVID-19 since April 2020. During the COVID-19 pandemic, one of the learning activities in schools that were previously face-to-face became learning held online [1].

Responsiveness in facing challenges is important to respond to the development of the digital era because various problems that arise in the digital era have entered all areas of human life [2]. Distance learning must be carried out by every element of education from the lower to upper class levels of education. This activity is indeed a solution for the teaching and learning process in these conditions, but there are many things that make online learning ineffective. One of them is the use of learning media that is abstract and difficult for students to understand. So that during the online learning, teachers tend to be limited to giving assignments without providing deepening of the material to make it easier for students to understand [3].

According to Stephen, Maire, and Doecke [4], the learning system implemented is expected to be able to develop students' skills, not only focus on academics and improve student test results. On the contrary, schools should help their students by facilitating them so that students become resilient individuals, active thinkers, broad-minded, creative problem solvers, and active members of their communities. Various skills outside the student's skills are important for learning in the 21st century, thinking, analyzing and problem-solving skills are useful for the advancement of students' potential in the future.

Learning carried out in the 21st century is needed to develop 21st century skills, it is intended so that students can adapt to technological innovations in the workplace. The 21st century context requires a new set of competencies beyond information and communication technology (ICT) literacy [5]. The involvement of students in learning activities results from a combination of the willingness of students to participate in learning activities and the efforts of students to be involved during time-efficient tasks [6]. Previous researchers stated that digital technology offers innovative answers to questions about how they learn, what they learn, and when they study [1]. In addition, technology makes it easy for teachers and students to access material even far beyond the usual textbooks used, the formats commonly used, and in a way that bridges space and time, in other words technology can make teachers and students learn anywhere, anytime and anywhere. Meanwhile, previous study [7] suggested that 21st century learning is expected to have an innovative platform to spread knowledge and skills to students such as creativity and team collaboration.

According to Shilo and Ragonis [8], educational policy makers have developed curricula that aim to help students develop collaboration, critical thinking, analysis and problem solving skills. However, the development of these skills strategies depends on the teaching scenario carried out by the teacher. Some experts recommend that a curriculum that is able to integrate technology and authentic experiences can support student participation, motivation, and knowledge of the subject matter and prepare students for less from the future [9]. There are various learning apps that make learning a fun experience in general and many mobile apps in particular are very helpful with learning and within the reach of the learner [10]. In other research [11] showed that the use of online learning mediation was more effective than regular learning in improving participants' critical writing skills and in increasing their learning motivation. Therefore, it is necessary for teachers to develop learning media so that students can be facilitated by these learning media during a pandemic like this [12].

Learning media are all forms and channels of conveying messages or information from the source of the message to the recipient that can stimulate the mind, arouse enthusiasm, attention, and willingness of students so that students are able to gain knowledge [13]. The process of utilizing learning media is a decision-making process based on the design of the learning system that will be used in carrying out the learning process. The use of multimedia will have an impact on improving the quality of learning, starting from increasing students' learning motivation [14], productivity, and improve students' math skills [15]. The use of multimedia in learning tends to be better and more effective in science learning, which allows the learning process to be student-centered so that it can create a more suitable learning environment [16].

For millennials and Z generations, learning is more effective with interactive learning, demonstrations, experiments and social networks than using traditional learning [17]. Mobile technology has brought social changes in many areas of human life [18]. Various new technology platforms such as mobile applications offer effectiveness and increase student performance especially in distance learning [19]. Mobile learning is a new learning method which in its application uses mobile devices [20]. This mobile learning has the characteristics to have a significant influence on learning even to the level of the student's teaching and learning environment [21]. Besides mobile learning demonstrates the potential to improve student learning as well as enable students to easily manage learning conditions and increase learning motivation. In other research [22], students have a relatively high level of motivation to achieve and learn well, but the perception of satisfaction and self-efficacy with mobile learning is relatively low. The characteristics of learning using mobile learning have a significant impact on all components of student learning [21]. There are two other key characteristics of mobile learning: portability and connectivity [23]. The ease of implementing online learning allows students to learn all learning materials using their mobile devices. Mobile devices used must be constantly evolving and have the ability to connect and communicate with learning websites using the device's wireless network. This is intended to make it easy for students to access material that is everywhere. In addition, this platform will also facilitate and develop students' creativity to collaborate with their peers to share materials, experiences and information in their learning [24].

Vocational high school requires learning strategies that require active students. This is to provide a tool for students to see the concept of building construction in the construction process which they will later use in the world of work. But in fact, learning in vocational high school has not been maximized for 126 students at vocational high school in Surakarta, researchers get data that 79.6% of students stated that when learning, the teacher only sent material without a complete explanation. This has a negative impact on students, only 11.1% of students understand the material and only 7% of students have high learning motivation. The learning step that needs to be done is to facilitate students to get a real picture of building construction even though distance learning is like this.

## 2. RESEARCH METHOD

This research was conducted in a vocational high school Surakarta, Central Java, Indonesia which was involved 126 students. This study used the research and development (R&D) approach. The development model adapted in this study is the Alessi and Trolip media development model. The adaptation stages in this research are planning, design, and development [25]. The planning stage provides a plan for the scope and limits of the product to be developed. The design phase is an introduction to the procedures for designing the content and design documents needed to complete product development. Attention at this stage is the detail of the entire media product. The development stage is the implementation stage of the design stage, which consists of media production activities ranging from computer programming, production of text, graphics, audio, video, and media usage guides. Development refers to the whole process of production, testing, improvement, and program validation which will be validated by media expert validators, expert validators, practitioner validators and tested on students before determining the final product to be tested in the real class. The percentage of instrument validity was obtained from the average value of the questionnaire using a Likert scale validation questionnaire. The scale used in the form of numbers 4, 3, 2, 1. The respective criteria are presented in Table 1. The analysis of the results is formulated in (1).

$$P = \frac{\sum x}{\sum xi} \times 100\% \quad (1)$$

where:

P=percent value sought/expected

$\sum x$ =total score

$\sum xi$ =maximum score

100=fixed number

Table 1. Modification of the Likert scale evaluation criteria [26]

Score	Description
4	If the rating strongly agrees
3	If the rating agrees
2	If the assessment does not agree
1	If the rating strongly disagrees

The evaluation instrument is said to be feasible if the interpretation is 61%. The criteria for interpreting the score of the evaluation instrument are presented in Table 2 [26]. Media that has been tested and declared suitable for use, then the media is used in classroom learning to increase the learning motivation among the respondents.

Table 2. Validation achievement conversion rate

	Interpretation
81-100%	Very worthy
61-80%	Worthy
41-60%	Decent enough
21-40%	Less worthy
0%-20%	Not worthy

## 3. RESULTS AND DISCUSSION

### 3.1. Media development

This initial production stage is the manufacture of mobile application-based learning media products. Researchers make initial products using software that is very familiar to the public, so this product is easy to develop by anyone; it is just that not many know this method. Researchers used Power Point software and then converted it to HTML5 using Ispring Suite 9 after being converted into an application using the WEB2APK builder. Figure 1 presents the stage in brief. This media has the advantage of delivering material using 3D building construction and contains video, audio. In the end, of the material there is a quiz whose scores will go directly to the teacher's email, to control student performance. The application display can be seen in Figure 2.



Figure 1. Mobile app development

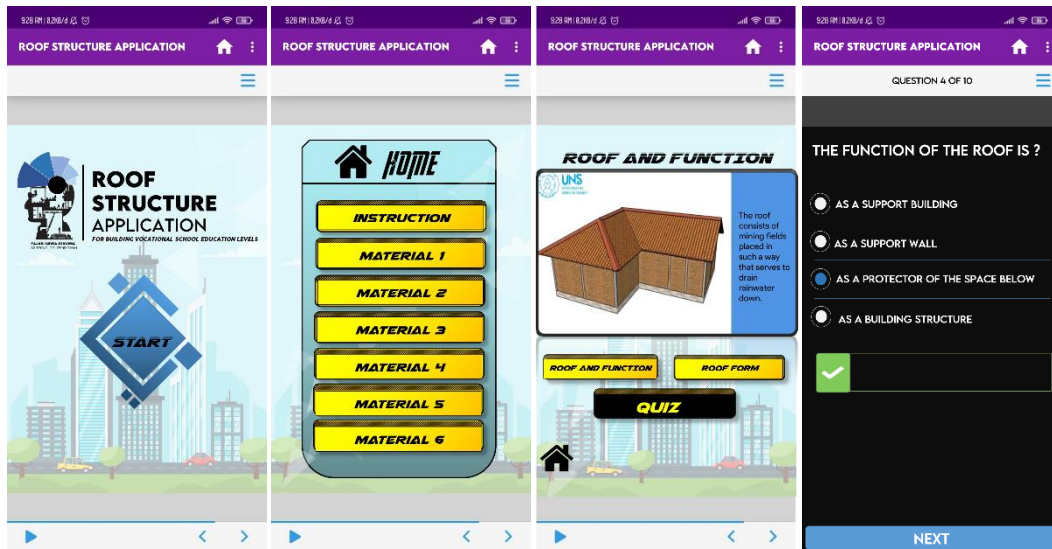


Figure 2. Multiple app views

**3.2. Alpha test**

To get the results of the alpha test on this media, expert judgment is needed, including: i) Two media experts will assess aspects of visual communication, illustration, and media benefits; ii) Two material experts will assess material aspects and material benefits; iii) Three expert practitioners will assess aspects of visual communication, illustration, and media benefits. In addition, expert practitioners will also assess material aspects and material benefits. The results of the expert validation assessment showed that media experts, material experts and practitioners stated that the media developed by researchers achieved the predicate of "very worthy". The results of the assessment are presented in Table 3.

Table 3. Expert assessment recap

No.	Expert validator	Percentage value	Interpretation
1	Medium 1	100%	Very worthy
2	Media 2	85%	
3	Material 1	100%	Very worthy
4	Material 2	95%	
5	Practitioner 1	87.5%	Very worthy
6	Practitioner 2	95%	
7	Practitioner 3	95%	

**3.3. Beta test**

Beta testing results in user functionality and product appearance. The results of the beta testing form the basis for distributing the final product. The beta test was conducted on 126 respondents. Table 4 describes the results of the student response questionnaire to the media. The table shows students' opinions about media products developed by researchers to obtain a score of 86.30% with the "very worthy" criteria.

Table 4. Questionnaire of students in the media

Aspect	Number of questions	Total	Percentage
Ease of understanding	1, 2, 3, 4, 5, 6	1,245	16.46%
Motivation	7, 8, 9, 10, 11, 12	1,296	17.14%
Interests and media	13, 14, 15, 16, 17, 18	1,406	18.59%
Media presentation	19, 20, 21, 22, 23, 24	1,298	17.16%
Media use	25, 26, 27, 28, 29, 30	1,277	16.89%
Total		6,525	86.30%
Maximum	30 questions	7,560	100%

### 3.4. Application of media to increase students' learning motivation

After the media is tested and declared suitable for use, then the media will be used in classroom learning to increase the learning motivation of vocational high school students in Surakarta majoring in civil engineering. The results of this test are presented in Table 5. Based on the table of statistical test results with the statistical package for the social sciences (SPSS) 25 program, both students' learning motivation obtained a significance level of 0.000.

There is a difference in mean among experimental class and control class on students' learning motivation. The comparison of the students' initial and final motivations can be summarized in Table 6. Based on the statistical test results table with the SPSS 25 program, the posttest value of the experimental class students' learning motivation was higher with an average score of 86.6 when compared to the control class which only had a score of 75.9. These results indicate that learning using mobile application-based learning media is more effective than classes that do not use mobile or conventional-based learning media.

Table 5. Test results independent samples test

		Levene's test for equality of variances		t-test for equality of means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean difference	Std. error difference	95% Confidence interval of the difference	
								Lower	Upper	
Student's motivation	Equal variance assumed	2.078	0.152	10.45	124	0.00	10.741	1.027	8.706	12.775
	Equal variance not assumed			10.45	118.9	0.00	10.741	1.027	8.775	12.776

Table 6. Test results independent samples test

Aspect	Mean	Std. Deviation	Significance	Difference	Trends
Experiment class	86.6	5.14080	Significant	-15.9	Enhancement
Control class	75.9	6.33452			

### 3.5. Discussion

This mobile application-based learning media is proven to increase students' learning motivation. This is in line with previous research [27]. They researched the development of android as a learning medium, the result is to make students more enthusiastic about learning, to make learning fun or interesting, to make them not study while studying, besides that it also makes the material more interesting to learn. In another study [19], the mobile-based learning media showed the potential to improve student learning and allow students to manage learning conditions easily and increase their learning motivation.

In addition, vocational students are educated to become graduates who are ready to work, which requires direct practice in the field, with this pandemic making this impossible. This learning media can facilitate students to present a virtual picture of how to construct buildings on the project. In another study [28], virtual practice-based learning media showed a positive effect on problem-solving skills than conventional methods.

This can be obtained because mobile learning has characteristics that are able to have a significant impact on students even to the teaching and learning environment [21]. In addition, online learning has the characteristics of informality and spontaneity [29]. This is certainly useful for facilitating learning, especially during the pandemic period which limits the meeting between teachers and students. This finding certainly adds to the reference of educators and distinguishes it from other research only by using software commonly used by educators, namely power point, it turns out to be able to produce effective applications in developing learning. These results make us believe in its potential to provide a variety of learning tools and support for additional materials that can be adopted by teachers or other educational designers [30].

#### 4. CONCLUSION

Learning using learning media based on mobile applications is an effective and appropriate choice in Indonesia because there are indeed many uses of smartphones among Indonesian students even in vocational high schools. The mobile technology market in Indonesia has always experienced rapid and strong growth in terms of smartphones. Media development is needed to overcome problems in learning. The development of learning media by researchers shows that experts and students have positive opinions about this mobile application-based learning media. All experts from media experts, materials experts, expert practitioners stated that this media is "very worthy". The results of the perception questionnaire of 126 students in Surakarta also rated media very eligible with a percentage value of 86.30%.

Mobile application-based learning media is proven to be effective in increasing student motivation in vocational high schools in Surakarta. With the acquisition of scores based on the results of statistical tests with the help of the SPSS 25 program, obtained a significance level of 0.000 which is smaller than 0.025 ( $0.000 < 0.025$ ), or  $t_{count} > t_{table}$  for learning motivation, which is  $10.450 > 2,000$  while the value then  $H_0$  is rejected and  $H_a$  is accepted or there is the mean difference between the experimental class and the control class. In addition, the posttest average value of the experimental class students' learning motivation was higher with a score of 86.6 when compared to the control class which only had a score of 75.9. These results indicate that learning using mobile application-based learning media is more effective than classes that do not use conventional or mobile-based learning media.




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