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[Research Article]

DEVELOPMENT OF MOBILE LEARNING BASED ON AN INTEGRATED PREDICTION GUIDE AS A SUPPORT OF PHYSICS LEARNING IN HIGH SCHOOL ON THE TOPIC OF WAVES

Aprilia Purwani, Irnin Agustina Dwi Astuti, Maria Dewati

Department of Physics Education, Faculty of Mathematics and Natural Sciences, Universitas Indraprasta PGRI, Jakarta, Indonesia

E-mail: irnin.agustina@gmail.com

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ABSTRACT

This research aimed to develop Android-based Mobile Learning media that is integrated with the Prediction Guide learning model using Smart Apps Creator software as research supporting high school physics learning on wave material. The research method used in this research is Research and Development (R &D) using the ADDIE development model (Analysis, Design, Development, Implementation, and Evaluation). However, due to the condition of the Covid-19 pandemic, this development research is only carried out until the development stage. The techniques used in analyzing data are descriptive analysis techniques by calculating the percentage of expert validation scores and student response tests. The analysis of this study obtained an average of 83% from media experts, 89% from material experts, and 86% from linguists. Thus, the overall average percentage of expert validation obtained an average percentage value of 86%, with very feasible information, and can be used in school. Meanwhile, the average percentage obtained from the student response test was 74% which describes a good response from the students.

Keywords: mobile learning, android, production guide, physics learning media.

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1. INTRODUCTION

The development of Science and Technology has dramatically affected all aspects of life, especially in the current 4.0 era. Technology is getting increasingly sophisticated, making every job easier to do. Smartphones are cellular phones with more capabilities, ranging from resolution, and features, to computing, including the presence of a mobile operating system (Daeng et al., 2017). Children have widely used smartphones to adults.

Physics lessons that are always considered complicated make many students dislike them. Not only that, there are even some students who always feel afraid every time this class is in progress, so teachers have to be smart to find ways to keep students focused and understand the material delivered. Learning difficulties are deficiencies that are not visible. Disabilities in learning cannot be recognized in different physical forms in people who do not have learning difficulties. Learning difficulties are always caused by low intelligence factors but can also be caused by other influences that come from outside (Utari et al., 2019). Difficulties in the teaching and learning process at school or home can be overcome by using learning media.

The state of the Covid-19 pandemic that does not subside makes the objectives of the learning process in physics subjects often not achieved because students lose focus when participating in distance learning (PJJ). Due to the absence of an accompanying teacher, the students' focus becomes more easily swayed, such as preferring to play games or open social media to replying to messages that make the concept of the material unable to be fully mastered. Even before the Covid-19 pandemic, physics subjects were considered complex subjects. If you look at the percentage in the survey image, I did use a questionnaire on 27 students from several high schools in Bogor Regency. As many as 19 students, 70.4 %, stated that physics was complicated and eight students, with a percentage of 29.6%, stated otherwise. Meanwhile, based on a questionnaire filled out by several teachers at the Bogor Regency Senior High School, they stated that physics lessons were tricky.

An increasingly advanced era with increasingly sophisticated technology makes everything easier (Salsabila et al., 2020). Especially in the current era of the Covid-19 pandemic, every learning process in schools has been replaced with distance learning (PJJ). Thus, technology is needed, for example, laptops or smartphones as media used by teachers and students to learn (Dwiyansaputra et al., 2021). The learning media that is currently suitable for use in online learning or distance learning (PJJ) is Mobile Learning.

Mobile learning is a learning media that utilizes information and communication technology (Yuniati, 2011). Mobile learning is one of the learning media that allows educators to deliver teaching materials to students using mobile-based media (Purnama, 2017).

This study explains using Mobile Learning learning media on business and energy materials. However, this study only aims to create a learning media without being integrated with a learning model that can assist teachers in compiling existing subject matter, prevent students from becoming bored quickly and attract students' interest in learning. Therefore, an Android-based learning media that has been integrated with the learning model is needed.

Apart from the learning media factor, the learning model is also significant. The learning model that supports online learning is the Prediction Guide learning model. A prediction Guide is a method of guessing lessons developed to attract students' attention during the learning process (Harefa, 2020; Hasniati, 2017).

Researchers use Prediction Guide, which is integrated with Mobile Learning and will be developed using Smart Apps Creator software and smartphones as the media. Using the Prediction Guide learning model is expected that students will continue to learn actively and optimize their affective level when using Mobile Learning.

2. METHOD

The method used in this research is Research and Development with the ADDIE development model (Analyze, design, development, implementation, evaluation). The ADDIE model is one of the interactive development processes with the primary stages of compelling, dynamic, and efficient learning. This research aims to obtain and develop engaging learning media so students can absorb the teacher's explanations well without misunderstanding concepts.

In this study, the analysis of the validation instrument and the student response instrument used a Likert scale to test the level of product feasibility. The assessment criteria provided are not good (1), good enough (2), good (3), and very good (4). Questionnaire answers are rated using scores 1, 2, 3, and 4. The data analysis technique used is a qualitative analysis technique to determine the average validation results from each expert.

Table 1. Learning media eligibility criteria

Percentage	Criteria
81 – 100%	Excellent
61 – 80%	Good
41 – 60%	Feasible
21 – 41%	Weak
0 – 20%	Poor

To find out student responses to mobile learning, researchers used questionnaire analysis with assessment criteria of strongly agree (5), agree (4), moderate (3), disagree (2), and strongly disagree (1) with the assessment criteria given a weight of 1,2,3,4,5. The following criteria from the results of the response test analysis can be seen in Table 2.

Table 2. Student response criteria

Percentage	Criteria
81 – 100%	Excellent
61 – 80%	Good
41 – 60%	Feasible
21 – 40%	Weak
0 – 20%	Poor

3. RESULTS AND DISCUSSION

The research results using the Research and Development (R & D) method with the ADDIE development model consisting of 5 stages, namely Analysis, Design, Development, Implementation, and Evaluation in the development of Android-based Mobile Learning, can be described as follows.

3.1 Analysis Stage

In the analysis stage (Analysis), researchers began to analyze the problems obtained from the needs analysis questionnaire shown to 3 teachers from different schools in Bogor. The results of the needs analysis questionnaire concluded that the teachers agreed that physics subjects were complex for students, so learning media were needed that could help overcome misunderstandings in the concepts taught in class. Then, this stage is continued by analyzing the applicable curriculum regarding wave material. This curriculum analysis aims to formulate achievement indicators, learning objectives, and essential competencies.

3.2 Design Stage

Second, in the design stage, several simple applications are used to create backgrounds and icons from Android-based mobile learning applications, namely Canva and PicsArt. The initial design of Android-based Mobile Learning uses a hierarchical navigation structure, where the structure describes the display of information in the application through branching forms—followed by the initial design of the template, which will later be used to place the material content.

3.3 Development Stage

Third, the development stage begins with the creation of mobile learning, which requires several additional applications, such as Canva and PicsArt, which are used to design the background and application logos that will be used later. The software is also used to create applications, namely Smart Apps Creator.

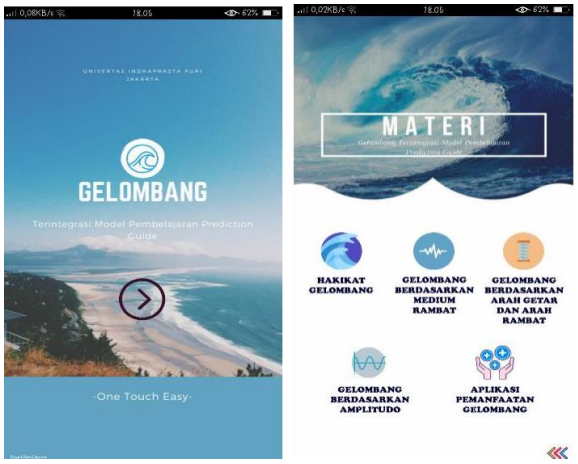

Figure 1. Mobile Learning Display

The program trials are carried out after the application creation has been completed to see if there are errors in the button commands that have been made before entering the next stage, namely mobile learning validation carried out by lecturers or teachers who are experts in their fields. The mobile learning application's validation stage is done by sending a Google Form questionnaire link to the validators who are divided into three groups: media experts, material experts, and language experts. The results of media expert validation carried out on three validators can be seen in Table 3.

Table 3. Media Expert Validation Results

Indicator	Expert Judgment		
	1	**2**	**3**
Design	4	4	4
	4	3	3
	4	4	3
	3	4	3
	3	3	3
	3	3	4
	2	2	4
	3	3	3
	4	2	4
Media Functions	4	4	4
	3	3	3
	4	3	3
	4	4	4
	4	3	3
	4	3	3
	4	3	2
Layout	3	2	3
	4	3	3
	3	3	4
	3	1	3
	4	4	4

From Table 3, the average value of full validation is 3.30, with a percentage of 83%. Several suggestions and revisions from the validators, namely regarding video display and video URLs that cannot be accessed. The results of material expert validation carried out on three validators can be seen in Table 4.

Table 4. Material Expert Validation Results

Indicator	Expert Judgment			
	1	**2**	**3**	**4**
Writing	3	4	3	3
	3	3	3	3
	3	4	3	4
	4	4	3	4
	3	4	3	3
	3	4	4	3
Language	3	4	4	4
	3	3	4	3
	3	4	4	4
	3	3	4	3

From Table 4, the average value of full validation is 3.57, with a percentage of 89%. Several suggestions and revisions from the validators, namely that the material's content is too short, and more examples are added. The results of the validation of linguists carried out by four validators can be seen in Table 5.

Table 5. Linguist Validation Results

Indicator	Expert Judgment			
	1	**2**	**1**	**4**
Writing	3	4	3	3
	3	3	3	3
	3	4	3	4
	4	4	3	4
	3	4	3	3
	3	4	4	3
Language	3	4	4	4
	3	3	4	3
	3	4	4	4
	3	3	4	3

Dari tabel 5, diperoleh nilai rata-rata total validasi sebesar 3,43 dengan presentase sebesar 86%. Ada beberapa saran dan revisi dari para validator yaitu Bahasa yang digunakan dalam menampilkan materi harus formal.

3.4 Implementation Stage

Fourth, in the implementation phase, researchers conducted small class trials by distributing questionnaires or response test questionnaires to students using google forms due to the Covid-19 pandemic. This small class trial was conducted on 27 students in several high schools in Bogor Regency because the researchers used a random sampling technique. The data can be seen in Figure 2 below.

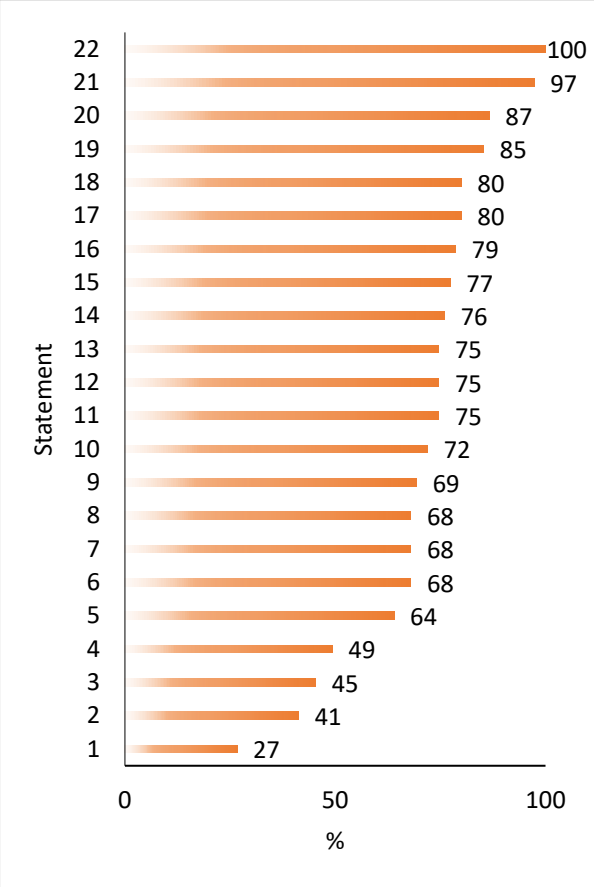

Figure 2. Graph Of Student Response Results

From the graph in Figure 4 above, the minimum average value is 70%, and the maximum average value is 81%, with excellent information after students use mobile learning applications.

3.5 Evaluation Stage

Fifth, the evaluation stage of the ADDIE development model (Analyze, Design, Development, Implementation, and Evaluation) is evaluation. They are starting from making mobile learning applications to the student response test stage in the evaluation stage. Researchers have made improvements to the mobile learning application following the suggestions and input from the validators. After the expert validation test and the student response test, the average value of expert validation was 86%, and the average student response test was 74%. If you look at the analysis results, the mobile learning applications that have been made are included in the excellent category and are suitable for use.

Android-based Mobile Learning is suitable for learning physics at the time of Distance Learning (PJJ) today because its more efficient use can be used anywhere and anytime, so there is no need to be confused when you want to repeat lessons that have been studied previously. Based on research by Astuti et al. (2017), Mobile Learning can increase student interest in learning, with an attractive appearance and the material presented following existing illustrations and learning videos. In addition, Dasmo et al. (2017) said that Mobile Learning could help students learn independently with the help of visualization of physics material in the form of illustrations and learning videos.

In addition, Ibrahim & Ishartiwi (2017) also explained that Android-based mobile learning is very interactive and suitable for teenagers under the level of youth development and current technology use. Android-based mobile learning can make students excited about learning physics so that student's understanding of physics concepts becomes even better (Syaputrizal & Jannah, 2019).

Android-based mobile learning integrated with the Prediction Guide learning model is very suitable for use because this learning model has an advantage. A prediction guide is a method of guessing lessons developed to attract students' attention during learning (Betari et al., 2020). There is a syntax in accordance with the prediction guide learning model that has been arranged so that students guess or predict the material that will be explained later.

Other researchers rarely use this Android-based mobile learning integrated Prediction Guide in developing Android-based learning media. With the existence of mobile learning, it can explain each stage to students so that they understand more about learning physics even though they are online. In addition, this android-based mobile learning can be used without being limited by space and time and is easy to use because the access can be used offline so that it will not burden students in learning physics.

4. CONCLUSION

Based on the research on the Development of Android-Based Mobile Learning Integrated Prediction Guide Model as Supporting High School Physics Learning on Wave Materials that has been carried out, it can be concluded that Android-based mobile learning gets an average percentage of overall media eligibility of 86% with very feasible eligibility criteria. Thus, learning media can be directly tested in schools. In addition, the analysis results obtained from the test of student responses to the use of Android-based Mobile Learning get a score of 74%, with the student response criteria indicating that the media gets a good response from the students.

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