The Development of Media Application Physics Learning Based Smartphone and Its Effects on Students' Learning Outcomes on Kinematics Materials

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Abstract. The ability of teachers in managing learning environments and utilizing cellular technology in learning will affect students’ interest in learning. The purpose of this research is to develop mobile learning media. This research uses two methods. First, it used a development research method with model Analysis, Design, Development, Implementation, Evaluation (ADDIE) and quasi-experimental design. This application is validated by experts for technical aspects and the students were also as an application user test. The results showed that both technically given a very good response to a mobile learning application, it means that can be used to increase student’ interest in learning. Finally, the effect of media application physics learning based smartphone to student' learning outcomes can help in increasing the students' learning outcomes.

1. Introduction
The technological development has brought enormous changes to various dimensions of human life, both in the field of economic, social, and educational. Technology in education is used to assist teachers in the management of teaching [1]. According to [2] to achieve the goal of learning, the teacher as a facilitator should be able to teach effectively or teacher can perform its function properly. Criteria for effective learning which are: 1). learning activities which are able to generalize abstract concepts into things that are easy to be understood, 2). strategies for teaching can be accepted with the ability of different students, and 3). learning activities that involve learners to active in the learning process so that it can achieve the purpose of the learning activity appropriate program that has been set. Professional teachers are teachers who can master the learning strategies with good, especially with the strategies teaching-learning with media and models because effective improve the quality of learning [3].
Media learning is strategies to enhance student interest and learning outcomes effectively. According to [4] low levels of competence of the students is caused by several factors, one of which is a monotonous learning process where teachers are less creative and innovative in using media of instruction. Learning media must be packaged as attractive as possible so that students can linger to study a material wherever and whenever [5]. So that mobile learning is very appropriate to use. According to [6] media learning by using mobile phone technology is called mobile learning. The mobile learning application is a sample application multitasking which enables learners to learn and access learning resources regardless of time and place both during training in the classroom or learning outside the classroom [7]. According to [8] Learning with integrated mobile learning can improve student learning outcomes reflections.

Smartphones are sophisticated cellular technology and many students used them in their daily lives, especially students in the city of Lubuklinggau. Smartphone is used by learners still limited to communication and entertainment such as Short Message Service (SMS), phone and games. This is generally due to lack of development of a mobile device as a medium of learning, and specifically conceived for media learning physics at the town of Lubuklinggau, Indonesia.

Media application physics learning based smartphone

A Smartphone is a mobile smart which is a mobile operating system (OS) be used on android mobile device consists of an operating system and core applications [9]. Whereas the media application physics learning based smartphone is an integrated physics learning application which consists of concept maps, materials study kinematics, video tutorials, sample exam questions, pre-test and post-test, and will display score the results of tests of learners. In making this application using some software include: 1). Integrated Development Environment (IDE) using the Android Studio, 2). Java Development Kit (JDK), 3) Software Development Kit (SDK), and 4) Notepad.

2. Experimental Method

This study used two methods, namely development and experimental methods. In the development method, the ADDIE model is used to develop media applications physics learning based smartphone. The stages of ADDIE development are: analysis, design, development, implementation and evaluating. While the experimental research is quantitative research that meets the requirements for testing a causal relationship. The research design used was a quasi-experimental design. The Flowcharts research brief can be seen in Figure 1 as follows.

![Flowchart](image-url)
2.1. Validation of Media Learning
Before it is implemented to students, media in the form of media application physics learning integrated need to be validated. Validation was carried out by two lecturers and one teacher to validate the contents of the material and learning media. Validation aims to find out whether or not the learning media is feasibly used in the study. The validation aspects are shown in table 1 below.

| Table 1. The aspect of the validation assessment |
|------------------------------------------------|
| No | Aspects of assessment for the content material | Aspects of assessment for media learning |
|----|-----------------------------------------------|----------------------------------------|
| 1  | The suitability of the material by the standards of competence and basic Competence | The development of media follow the development of Science and Technology |
| 2  | Clarity of the formulation of learning objectives | Media support for the independence of the student learning |
| 3  | The suitability of the materials with the purpose of learning | Creativity and innovation of the media learning |
| 4  | The delivery of the content material comprehensible educates participants | Media capabilities to encourage curiosity learners |
| 5  | The truth of the material aspects of the concept of science | Ability media adds to the motivation of learning to the learners |
| 6  | The suitability of the material with an indicator | Media capabilities add to the knowledge |
| 7  | The completeness of the material | Attractive design |
| 8  | The clarity of the example | The ease of operation of the media |
| 9  | variation of exam questions | The practicality of using media |
| 10 | The truth of the answer keys | The effectiveness of the use of the media |

The scale of assessment used for validation is 1 to 5. The decision is worthy or not of the media used in the study were taken from the average of the results of the assessment by the validator. Measurement range from the feasibility of media refers to the scale percentage of the [10].

2.2. Data collection techniques
The collection of data in this study used the tests. Tests conducted namely pre-test and post-test. The number of questions 50, with multiple choice forms. For test experiments classes are provided in the application, while the test control class is provided on the test paper. The instrument is based on a standard competency curriculum material kinematics. The results of this test can see the difference in the results of the study on the experimental group or the control group before and after being given the treatment.

2.3. Data analysis technique
This study used descriptive statistics to describe the high and low learning outcomes of students due to the influence of Media application physics learning based smartphone. The statistical test used in the study is the t-test with data loaded with normal and homogeneous distribution. If the data is not normally distributed and homogeneous, the hypothesis test analysis is used the Mann-Whitney U test [11].

3. Result and Discussion
3.1. The Media Learning development
The media development in the form of media application physics learning based smartphone follow the ADDIE model of development with the stages of analysis, design, development, implementation, and evaluating.
3.1.1. Stage of analysis (needs)
Based on the observations that have been made, most of the students in high school the town of Lubuklinggau using smartphones so that support to do research on the use of the media the application of physics learning based integrated smartphone for learning.

3.1.2. Stage of design
The media design stage is the making of the overall media design (storyboard), making the background, images, buttons, main menu, making materials, tutorial videos, sample questions, exam questions, and others.

3.1.3. Stage of development
All components that have been prepared in the design phase are then assembled into a single entity by using the android studio. Components assembled in accordance with the storyboard that was made earlier. Screenshots of the results of the media application physics learning based smartphone shown in Figure 2, 3, and 4 below.

3.1.4. Stage of implementation
The research was implemented on the 10th Grade Students at High School in the town of Lubuklinggau, Indonesia. Samples were taken using cluster random sampling and obtained four high
schools as a sample. Furthermore, taken two classes as a grade control and experimental classes by means of random at each school.

3.1.5. Evaluating.

Each content and aspect of the learning media after being made is then validated to determine the quality of the media. According to [12] content testing largely determines the feasibility of learning media before being used in research. Once validated by the content expert, media revised appropriate input from the validator. The results of the validation of material and media experts to find out the feasibility of the learning media assessment on a scale of 1 to 5 are presented in Figure 5.

![The Average Results of the Expert Validation Contents of Material and Media Learning](image)

Figure 5. The average results of the expert validation contents of material and media learning (the average assessment for each aspect and the overall validation)

Figure 5 shows, all aspects that are assessed to validate the content of the material obtained an average score of 85.3%, while the overall validation of media obtained an average score of 95.3%, meaning that the results of the assessment criteria in the categories of very decent. The results of the validation of material experts and media, who stated that the media application physics learning based smartphone is very feasible to be used as a learning medium, then the media can be used in the research.

3.2. Student learning outcomes

The data results of the study were presented in the form of a table: the price of the average, standard deviation, t-test, and an increase in the results of the study. The t-test was used to find out whether there was a difference between the results of pre-and post-test test classes are experimental and control classes. The hypothesis tested in this study are H0: there was no significant difference between the control and experimental classes, H1: there were significant differences between experimental and control classes. The data is further analyzed to answer the problem of research. Explanation of data analysis and discussion contained in table 2 below.

| No | The Name of the School | Group | Average of Value Test | Improved Learning Outcomes |
|----|------------------------|-------|-----------------------|----------------------------|
|    |                        |       | Pre-test | SD | Post-test | SD | Control | Experiment |
| 1  | SMA N 1                | Control | 60   | 6.5 | 80   | 4.8 | 20% | - |
|    |                        | Experiment | 57 | 2.4 | 82 | 3.5 | - | 25% |
|    |                        | The significance of the t-test | 0.713 | - | 0.008 | - | - | - |
The significance of the t-test 0.452 - 0.000 - - -

H0 Accepted - Rejected - - -

2 SMA N3

| Group | Average of Value Test | Improved Learning Outcomes |
|-------|-----------------------|-----------------------------|
|       | Pre-test  | SD   | Post-test | SD   | Control | Experiment |
| Control | 55       | 3.5  | 67       | 2.6  | 12%     | -          |
| Experiment | 53    | 4.7  | 80       | 4.4  | -       | 27%        |

Table 2 shows in all of the control class have a hypothesis H0: accepted, meaning that there are no significant differences between experimental and control class or value significance test-t > 0.05, whereas in all classes of experiments the hypothesis H0: rejected, meaning that there is a significant difference between experimental and control class or value significance test-t < 0.05. Improvement of the results of learning in class experiments using media application physics learning based smartphone average 27.5%.

4. Conclusions

It has been successfully done development of media application physics learning based smartphone. The results of the development of the media were rated very well by the validator, the results of an assessment of the material obtained an average score of 85.3%, while the overall validation of media obtained an average score of 95.3%. The results of the implementation of application usage media application physics learning based smartphone in high school at the town of Lubuklinggau i.e. could improve learning outcomes of 27.5%.

5. References

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