Development of Educational *Game*- Based Learning Media to Increase Student Learning Motivation in Informatics Subjects

Luluk Mauli Diana[1], Ana Yuniasti Retno Wulandari[2], Alfina Kusuma Nilasari[3]

{luluk.diana@trunojoyo.ac.id [1], ana.wulandari@trunojoyo.ac.id [2], alvinakusumaaa@gmail.com [3]}

Trunojoyo University of Madura, Bangkalan[1,2,3]

Abstract. The development of technology brings changes in the field of education, one of which is to improve the quality of learning. The study used the Research and Development (R&D) method with the ADDIE development model which includes five stages: analysis, design, development, implementation, and evaluation. Media expert validation obtained a result of 96.3% with the category "very good," while material expert validation obtained a result of 98.4% with the category "very good.". In individual trials, the percentage of eligibility reached 96.3% with the category "very good," small group trials reached 96.6%, and large group trials reached 91.36%. The results of student learning motivation also showed a significant increase. In individual trials, learning motivation reached 93.3%, small group trials 91.3%, and large group trials 90.1%. With these results, it can be concluded that the developed Android-based educational game is feasible to use and effective in increasing student learning motivation.

Keywords: *Development, Learning Media, Educational Games, Learning Motivation*

1 Introduction

The development of information technology affects almost every area of life, including education. Education using information technology has two advantages. First, as the driving force of the world of education, including teachers, we are expected to be able to appreciate the potential of education to the maximum, and second, we encourage students to take advantage of every opportunity available. Student learning is facilitated if appropriate media, technology, learning resources, and learning environments are available. According to Suryani [1] learning media is a tool used to explain parts of a learning program that are difficult to explain verbally. Media is not only used as a means/learning aid but has a role in improving learning outcomes so that learning objectives can be achieved properly.

Educational games are one of the game media that contain learning materials and are used to educate and guide students in a fun learning process according to Winarni et al [2] . In addition to being a learning aid, educational games can also help students develop social, cognitive and emotional skills. Educational games can motivate students to learn actively and creatively

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through various challenges given, which encourage them to think critically and find solutions in a fun way Damarjati & Miatun [3] .

Android is a popular open-source operating system and is chosen as a platform for developing educational games Yunanto [4] . Android is a Linux-based operating system used on touchscreen phones and tablets, designed to support a variety of interactive applications and features that make it easier for users Sulistyowati et al [5] . With the flexibility of Android, developers can create innovative and easily accessible applications, including educational applications that can increase students' motivation to learn.

According to Heri [6] motivation is an urge that arises in a person consciously or unconsciously to do something with a certain purpose. Motivation is an effort given by the teacher to encourage students to be confident and able to achieve the expected goals and is a potential in students to achieve these goals Ramadhani & Muhroji [7] . Motivation is an internal drive that drives someone to do certain activities to achieve goals, which is important for students in improving performance so that the teaching and learning process takes place well and smoothly. According to Sardiman [8] motivation is an internal drive that drives someone to do certain activities to achieve goals, which is important for students in improving performance so that the teaching and learning process takes place well and smoothly.

Based on the results of observations through interviews conducted by informatics subject teachers at SMKN 1 Sepulu, it is known that the lack of student learning motivation, especially in informatics subjects, this lack of motivation is caused by material that is difficult to understand because the learning media is less effective and students tend to prefer playing smartphones. Therefore, to overcome this problem, researchers want to develop a learning media based on educational games that are expected to increase student learning motivation, because in educational games students are actively involved in the learning process which is packaged in games, so that students' curiosity about the material they will learn will increase, thus it can provide a positive influence on student learning motivation. Therefore, researchers want to conduct a study entitled " Development of Educational Game-Based Learning Media to Improve Student Learning Motivation in Informatics Subjects".

2 Research Method

This study uses the research and development method (*Research and Development)* which is used to create and test the effectiveness of the product Sugiyono [9] . In line with that, according to Sukmadinata [10] research and development is a process to create a product or improve an existing product and can be accounted for. This study uses the ADDIE model which contains 5 studies including analysis, design, development, implementation and evaluation.

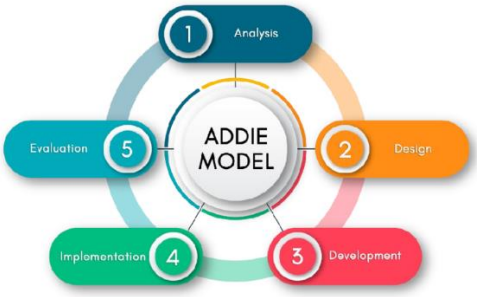


Figure 1ADDIE Model

Analysis stage is the initial stage in the form of collecting data, identifying problems and analyzing needs. At this stage, researchers analyze needs based on the results of observations that have been made, namely the need for educational game learning media to help the learning process become more effective.

Design stage is the second stage in the form of making a design plan/storyboard. The design stage is the initial product design that is developed (Mawarni & Hendriyani [11] . The purpose of making a design plan/storyboard is to find out the flow of the educational game that will be made.

Development stage is a stage that aims to design and validate the selected learning resources Hidayat & Muhamad [12] . This stage is the third stage in the form of creating an educational game application based on the design/storyboard that was created at the design stage.

Implementation stage is the fourth stage in the form of testing the educational game application that has been created. This stage is carried out to ensure that every function in the system can operate properly. If deficiencies are found, improvements will be made until the system functions optimally and in accordance with user needs [13].

Evaluation stage is the last stage carried out in the ADDIE development model. Researchers only conduct formative tests at this stage, because this type of evaluation is related to the development research stage which aims to perfect the resulting product.

The subjects of the trial in this study were 21 students of class X TKJ SMKN 1 Sepulu. Data collection techniques were carried out through interviews with informatics subject teachers and giving questionnaires to respondents. The data analysis techniques used are qualitative and quantitative analysis. Qualitative analysis is used to process data from experts in the form of suggestions, criticisms and inputs used to improve educational game products. While quantitative analysis is used to process data in the form of numbers. The product feasibility assessment instrument is used to determine the feasibility score and analyze validity through experts. The calculation of feasibility and motivation results is done using the formula:

$$\text{Percentage of Answers} = \frac{\Sigma x}{\Sigma SMI} \times 100\%$$

Information :
$\sum$ x = Total Score
SMI = Score Maximum Ideal

The product feasibility assessment instrument can be seen in table 1.

Table 1 Eligibility score

No	Category	Score
1	Totally Inappropriate	1
2	It is not in accordance with	2
3	Quite Appropriate	3
4	In accordance	4
5	Very Suitable	5

Meanwhile, the assessment instrument to determine the score of the results of calculating student learning motivation is as follows:

Table 2 Motivation scores

No	Category	Score
1	Very good	5
2	Good	4
3	Neutral	3
4	Not good	2
5	Very Bad	1

3 Results and Discussion

This research is included in the type of development research that aims to produce an application in the form of an Android-based educational game as a learning medium for informatics subjects. This educational game application was developed for use on Android smartphones as a means of learning infrastructure in the classroom. This application is an innovation in learning media that can be utilized by teachers and students. The development of this Android-based educational game application uses the ADDIE development model which consists of five stages, including:

3.1 Analysis Stage

Based on the results of interviews with informatics subject teachers, especially in class X TKJ SMKN 1 Sepulu, information was obtained that the use of learning media is still limited and the use of Android in learning is not optimal. This is due to the fact that Android devices are more often used for playing games or social media than for learning activities. Therefore, to overcome these problems, learning media are needed that can overcome the limitations of existing media and reduce the use of less productive Android in class, so that it can improve student learning outcomes.

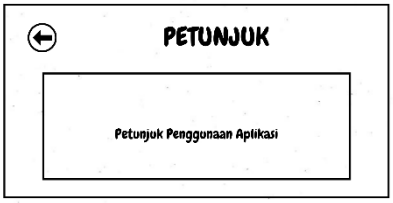
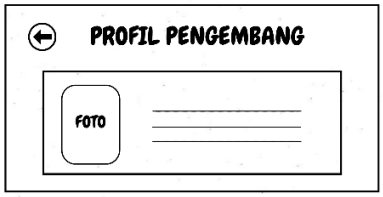
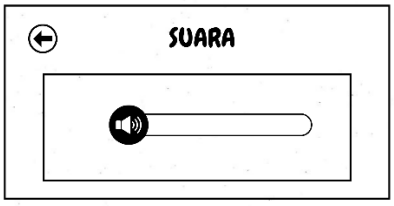
3.2 Design Stage

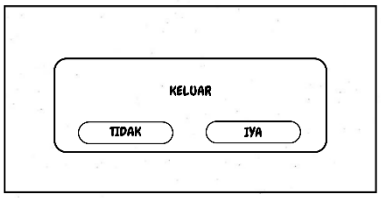
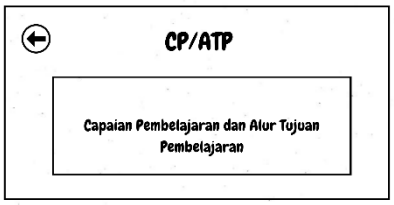
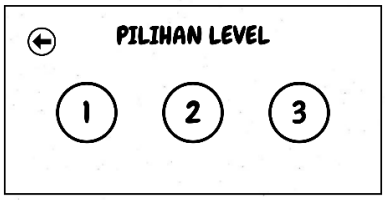
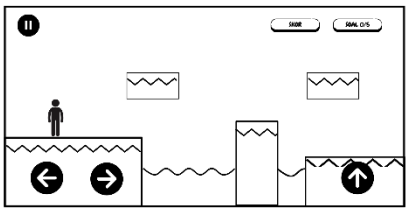
This android-based educational game application is operated for one user. Before carrying out the application development process, first create a design to find out the flow of the application to be developed.

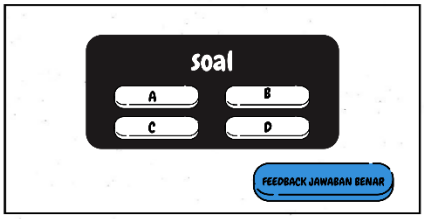
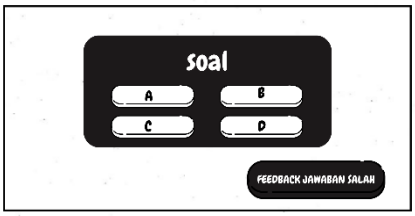
3.2.1 Storyboard

Storyboard is a picture or design that will be used as the initial design of the educational game application display before entering the development stage. The design of the android-based educational game is carried out as in table 2.

Table 3Storyboard

No	Picture	Information
1		Initial view of the android-based educational game application
2		Display of the instruction menu for use of the educational game application
3		The developer profile menu display contains the biodata and photo of the educational game application developer.
4		The sound menu display is used to adjust the sound volume.

No	Picture	Information
5		Exit menu display from educational game application
6		Display the learning menu containing learning materials.
7		The CP/ATP menu display contains learning achievements and learning objective flow.
8		The game menu display contains 3 level options.
9		The game display will contain several questions/problems.

No	Picture	Information
10		Question display with feedback if the answer is correct, it will be colored blue.
11		Question display with feedback if the answer is wrong, it will be colored black.
12		Appearance when the player is finished play games .

3.3 Development Stage

Development stage is the development process or educational game creation using Unity and Visual Studio Code software, according to with storyboard design .

Figure 2 Results of Android-Based Educational Game Applications

After the Android-based educational game application is completed, testing is carried out by experts to assess the feasibility of the application. In this study, the researcher involved two expert validators, namely media experts and material experts, to conduct validation. Product trials were carried out by media expert validators and material experts as follows:

Table 4 Table of expert test results

Aspect	Percentage	Category
Media expert	96.3%	Very good
Subject matter expert	98.4%	Very good

The results in Table 4 show that media experts gave an assessment of 96.3%, while material experts gave an assessment of 98.4%. This proves that the Android-based educational game application is very feasible to be implemented for TKJ class X students of SMKN 1 Sepulu.

3.4 Implementation Stage

The implementation stage is the application testing stage to evaluate user perceptions of the developed application. Testing is carried out using the User Acceptance Test (UAT) through a series of questions about the feasibility of the application. In addition, testing is also carried out to assess the impact of the application on student learning motivation. The trial was conducted on class X TKJ students with a total of 21 students, including individual trials (3 respondents), small group trials (6 respondents), and large group trials (12 respondents).

3.5 Evaluation Stage

The evaluation stage is the last stage after the testing stage by calculating the results of the user trial. At this stage, testing is carried out to assess the feasibility of the android-based educational game product and to assess the extent of student learning motivation after using this educational game product.

Table 5 Product trial results table

Aspect	Percentage	Category
Individual trials	96.3%	Very good
Small group trials	96.6%	Very good
Large group trials	91.36%	Very good

Table 6 Table of learning motivation results

Aspect	Percentage	Category
Individual trials	93.3%	Strongly agree
Small group trials	91.3%	Strongly agree
Large group trials	90.1%	Strongly agree

4 Conclusion

Based on the research that has been done, it can be concluded that this android-based educational game was developed using the ADDIE model. This educational game was developed using unity software and visual studio code. Based on the results of the media expert validation test, the percentage result was 96.3% with the category "very good" and the validation of the material expert obtained a percentage result of 98.4% with the category "very good". Then the user trial was conducted on students to determine the extent to which the game is feasible and the extent to which the application can increase student learning motivation. In the user trial, it was divided into 3, namely individual trials, small group trials and large group trials. The results of the product trial in the individual trial obtained a percentage of 96.3% with the category "very good", then the results of the small group trial obtained a percentage of 96.6% with the category "very good". While the results of the large group trial obtained a percentage of 91.36% with the category "very good". While the results of learning motivation in the individual trial obtained a percentage of 93.3%. The results of the small group trial obtained 91.3% and the results of the large group trial obtained 90.1%. Therefore, it can be concluded that the development of Android-based educational games that have been developed is feasible to use and can increase students' learning motivation.

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