Letters in Information Technology Education (LITE)
Vol 5, No 1, 2022, pp. 1-5
e-ISSN: 2654-5667

Game-Based Learning Media Development With RPG Mechanisms in Programming Subjects Base

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Article Info

Article history:
Received: Jan 28, 2022
Revised: Feb 10, 2022
Accepted: Feb 25, 2022

Keyword:
Game Based Learning
Role Playing games
Educational Games
Learning Media
Basic Programming

ABSTRACT

Learning activities for students in the current era, especially in productive subjects, must be interesting, innovative, and fun. In order to realize this, one of the efforts that can be done is to use appropriate media. The results of observations made by the author at SMK Negeri 1 Kepanjen showed that students claimed to lack understanding of productive materials, especially in basic programming subjects. At the time of delivery of material, educators often use media that are less interactive, so students are quickly bored. Therefore, to overcome the problems that have been explained previously, the author develops a game based learning (educational game) that uses the Role Playing Games (RPG) mechanism as a learning medium. This study aims to determine the feasibility of the educational game developed by the author. The author develops an educational game that uses the Role Playing Games (RPG) mechanism in basic programming subjects. This research uses the Addie research model according to what Branch (2009). The trial subjects of this study include material experts, media experts, and also students of class X RPL and X TKJ at SMK Negeri 1 Kepanjen. Educational game learning media developed have been through validation from media experts and material experts, and a trial has been tested on small group users and large groups. From various validation and testing results, this learning media received a percentage of 87.3% of 93.7% media experts from mater experts, 94.3% of small group trials, and 90.1% of large group trials. The percentage results obtained through validation and trials as a whole are classified in the very valid and very feasible category. So it can be concluded that the media based learning using the Role Playing Games (RPG) mechanism is very valid and feasible to be used in learning activities.

I. INTRODUCTION

The development of technology, especially in the field of Information and Communication Technology (ICT), provides benefits that can be felt by many people. No exception in the world of education, ICT plays an important role in improving the quality of education in Indonesia. Information technology in learning can help students in learning and can also help teachers, especially in utilizing facilities for their teaching purposes [1].

Problems in the world of education in Indonesia are generally related to the learning process in which it contains learning methods and learning resources. Hafid said that learning resources can be interpreted as all things which in their design, can be done intentionally or unintentionally that can be used to help students learn [2]. Along with the development of information and communication technology, learning media used by teachers must be in accordance with the characteristics of students. Today students like to play games whether it's on a smartphone or on a PC. On the other hand, now many learning media are also found in the form of game based learning (educational games) that are presented to students. The media was proven to be effectively applied in learning, the statement was strengthened by the results of research from Tham & Tham (2014) which showed that 19 out of 20 students enjoyed game based learning [3].

Referring to the results of the questionnaire distributed by the writer to students of class X RPL and TKJ expertise competencies at SMKN 1 Kepanjen, as many as 42.1% or 61 of 145 students choose the subject as the most difficult subject especially in the concept / theory understanding section. This is also justified by the majority of class X MM students at SMKN

7 Malang, in accordance with the explanation given by one of the KPL teachers who taught basic programming subjects. From the results of observations the author also found the fact that students feel a little bored when getting the learning that they find it difficult to understand. The methods and learning media used by the teacher must be more attention, so that the problem can be overcome.

Based on some of the problems that have been explained previously, to overcome this, it is necessary to develop learning media that are interactive and fun for students. As stated by Brom et al, (2010) Digital Media Game Based Learning (DGBL) is included in the category of software that has the main purpose of helping students and teachers in the learning process by utilizing games as their medium [4]. In this case the Role Playing Games (RPG) game is considered suitable to increase the interest and ability to understand the material of students in the basic programming eye. RPG is a focus on culture, storyline, process in the game, experience and interaction from users, as well as character design [5]. Ask8-Team in his writing argues that RPG games have several benefits, including: (1) Increasing social interaction, (2) developing the ability to solve problems (problem solving), (3) training creativity, and (4) as a relaxation tool /Entertainment from everyday life [6]. So that RPG games can be utilized in developing educational games for basic programming subjects. From the various problems described earlier, research has been carried out to develop game based learning media using the Role Playing Games (RPG) mechanism as a support for basic subjects of computer and informatics engineering expertise programs.

II. METHOD

The method used in this research and development is the ADDIE development research model. In addition to being used to develop products in addition to developing products in the form of media products, it can also be used to develop other products such as learning methods and teaching materials [7]. The Addie model was chosen because at each stage an evaluation was carried out, so that it could facilitate the writer in correcting the mistakes that were at each stage. It also prevents a buildup of errors at the end of the stage. If there is a buildup at the end of the stage, it will require a longer process because it can be improved must be carried out on the results of work at the initial stage while the process has reached the final stage. The stages contained in the Addie Development Research Model are Analyze, Design, Develop, Implement, and Evaluate, or more details can be seen Figure 1 on the next page.

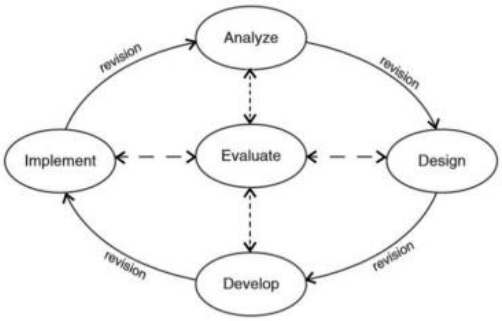

Fig. 1. ADDIE Development Model Stages, Source: [7]

After the product is completed, learning media products in the form of educational games will go through a validation process by material experts and media experts. There are 2 material experts who do validation, they are Lecturers of Electrical Engineering Malang State University and Kepanjen 1 Vocational School Teachers who support basic programming subjects. Then for the validation of media experts carried out by a lecturer in the Department of Electrical Engineering, State University of Malang. Material experts and media experts are given a validation questionnaire in which the results of filling the questionnaire will be managed based on the formula or equation adapted from Akbar (2013) [1]. The intended equation is demonstrated in equation 1 and equation 2 below.

Data processing for each item:

$$V = \frac{Tse}{Tsh} x\ 100\% \quad (1)$$

Information:
V = Percentage
TSe = Total empirical score (total score achieved)
TSh = Maximum total score (expected total score)

Overall data processing:

$$V = \frac{\sum Tse}{\sum Tsh} x\ 100\% \quad (2)$$

Information:
V = Percentage
∑TSe = Total empirical score (total score achieved)
∑TSh = Total maximum score (expected total score)

After the data processing process and the results of learning media validation are obtained, a improvement or revision of the product developed. The product improvement refers to the media validation criteria adapted from Akbar shown in Table 1 [8]. Furthermore, the learning media will be tested to the user. The user in question is students of class X RPL 4 and X TKJ 4 SMK Negeri 1 Kepanjen. In this trial process, there are two stages in its implementation. The first stage is a small group trial involving 10 students. Then the second stage is a trial of large groups conducted by 32 students. This user trial assessment is based on the feasibility criteria of the learning media shown in Table 2.

TABLE I. LEARNING MEDIA VALIDITY CRITERIA

Percentage	Validation Criterias
85,01 – 100,00	Valid, or usable without revision
70,01 – 85,00	Valid enough, or usable but available small revision
50,01 – 70,00	Not valid, it is recommended not to use because it needs a major revision
01,00 – 50,00	Invalid or should not be used

Source: [8]

TABLE II. LEARNING MEDIA ELIGIBILITY CRITERIA

Percentage	Validation Criterias
81,01 – 100,00	Highly valid, highly effective, highly thorough, usable without revision or improvement

Percentage		Validation Criterias
71,01 – 81,00	–	Valid enough, effective enough, complete enough, usable but there are minor revisions
41,01 – 61,00	–	Less valid, less effective, less complete, needs improvement large, it is recommended not to use
21,00 – 41,00	–	Invalid, ineffective, incomplete, unusable
00,00 – 21,00	–	Very invalid, very ineffective, very incomplete, no can be used

Source: Akbar (2013)

III. RESULT

After product development, a game based learning media is produced using the Role Playing Games (RPG) mechanism as a support for basic programming subjects for computer and informatics engineering expertise programs. During the development process, the author uses the RPG Maker MV game, Adobe Photoshop CC 2019 to design some game assets, as well as Enigma Virtual Box to package games into one unit. In this game there are 3 competency content, including: (1) Understanding the Software of the Programming Language; (2) apply the use of data types, variables, constants, operators, and expressions; and (3) applying the branching structure of the programmal language. Learning media that have been developed can be seen in Figure 2 - Figure 4.

This developed educational game is named "Knight - Adventure of Knight Programmer". This game will run well on a PC or laptop that uses the minimum specifications as follows: (1) RAM of at least 2 GB; (2) Minimum Intel Celeron Dual Core processor; (3) Minimum Windows 7 OS; (4) a minimum screen resolution of 1280 x 720 pixels; and (5) there is an empty space on the hard drive of at least 300 MB.

Fig. 2. Main Menu Display

Fig. 3. Game Control View

Fig. 4. Material Explanation Display

TABLE II. MEDIA EXPERT VALIDATION RESULT DATA

No	Assessment Aspects	∑Tse	∑Tsh	V(%)	Criteria
1	Software engineering	57	65	87,7	Very valid
2	Learning Design	18	20	90	Very valid
3	Visual Communication	56	65	86,2	Very valid
	Amount	131	150		
	Average			87,3	Very valid

IV. DISCUSSION

After product development, the next step is to validate by media experts and material experts. Validation of media experts is carried out by competent lecturers in accordance with research topics from the Department of Electrical Engineering, State University of Malang. After trying and playing this educational game, media experts fill in the validation questionnaire that had previously been given. Based on the overall data processing formula (according to equation 2) and by adjusting the percentage of validity according to Table 1, the data is obtained as in Table 2.

Based on the data shown in Table 2, the validation results of media experts are categorized as very valid. This happens because the average value of all aspects is 87.3%. Before continuing to the next stage, the media is repaired again in accordance with the advice of media experts. Media experts argue that there are some things that are not suitable one of which is the selection of words that are not good. Revision or adjustment of words made in line with the findings of Dian Anggraeni who reveal that the selection of languages used in learning media must still pay attention to the behavior and effectiveness in the preparation of sentences, so that later students can easily understand the contents in the learning media [9].

Furthermore, the validation of the material expert is carried out by 2 validators. The first material expert validator is carried out by a competent lecturer in accordance with the research topic of the Department of Electrical Engineering, State University of Malang. While the second material expert validator was carried out by one of the basic programming subject teachers at SMK Negeri 1 Kepanjen. After trying and playing this educational game, the first material expert fills the

validation questionnaire that was previously given. Based on the overall data processing formula (according to equation 2) and by adjusting the percentage of validity according to Table 1, the overall data is obtained by the two validators as they exist in Table 3.

Based on the data shown in Table 3, the validation results of the material expert are categorized as very valid. This happens because the average value of all aspects is 93.7%. Material experts provide advice related to instructions in the game. He said that the game is good, but it needs to be added some assets such as a guide. This is reinforced by the findings of Fajar, that the instructions for use in learning media are used to help students in accessing learning media [10]. So that the learning media can be carried out to the next stage. After validation by experts, the next learning media is tested on the user where the user is students. Students who are the subject of the trial are a combination of class X RPL 4 and X TKJ 4 SMK Negeri 1 Kepanjen. The user trial process is carried out in two stages. The first stage is a small group trial conducted by 10 students. After experimenting with the use of learning media in small group users, the test results were obtained shown in Table 4.

Based on the data shown in Table 4, the trial results conducted by small groups are categorized as very feasible. This happens because the average value of all aspects is 94.3%. Some trial subjects from small groups argue that this learning media can foster the independence of students in learning. In line with this statement, there are findings from Kurniawan et al., which states that students need to instill independent learning nature because it can foster a sense of responsibility in managing and making themselves a disciplined person [11].

TABLE III. DATA FROM THE VALIDATION OF MATERIAL EXPERT

No	Assessment Aspects	∑Tse	∑Tsh	V(%)	Criteria
1	Software engineering	198	21o	94,2	Very valid
2	Learning Design	36	40	90	Very valid
3	Visual Communication	19	20	95	Very valid
	Amount	253	270		
	Average			93,7	Very valid

TABLE IV. DATA ON SMALL GROUP TRIAL RESULTS

No	Assessment Aspects	∑Tse	∑Tsh	V(%)	Criteria
1	Software engineering	611	650	94	Very decent
2	Learning Design	619	650	95,2	Very decent
3	Visual Communication	608	650	93,5	Very decent
	Amount	1838	1950		
	Average			94,3	Very decent

The second stage of the user trial is a large group trial conducted by 32 students. After experimenting the use of learning media in large group users, the test results were obtained shown in Table 5.

Based on the data shown in Table 5, the trial results conducted by large groups are categorized as very feasible. This happens because the average value of all aspects is 90.1%. In addition, the majority of large group students revealed that learning media interesting and exciting to play. In line with the opinion of Elmunsyah et al., that a learning media would be better if it has aspects of entertainment (entertainment) [11], [12]. This can increase the interest in learning from students because they can play while learning.

V. CONCLUSIONS

Based on this research and development, learning media is produced in the form of game based learning using the Role Playing Games (RPG) mechanism as supporting the basic programming subjects of Computer and Information Engineering Expertise Programs. The material contained in this educational game is (1) understanding the programming language software; (2) apply the use of data types, variables, constants, operators, and expressions; and (3) applying the branching control structure in a programming language. This learning media is considered good by material experts and media experts who have validated him. The validation results carried out by media experts show a percentage of 87.3% and are classified as very valid. Similar to media experts, material experts also provide a very valid assessment for this learning media. This is evidenced by the obtained percentage of 93.7%. Educational games developed are felt according to the characteristics of students. The statement was strengthened by the data taken from the trials of small group students and large groups. In a small group trial obtained by the results of a percentage of 94.3% and was declared very feasible. Not far from the previous results, the results of processing large group trial data received a percentage of 90.1% and were declared very feasible. So that from various data processing from experts and trial subjects, it can be concluded that the media based learning uses the Role Playing Games (RPG) mechanism as a support for the basic programming subjects of Computer and Information Engineering Programs can be declared very valid and very feasible to use on Learning Activities.

TABLE V. DATA ON LARGE GROUP TRIAL RESULTS

No	Assessment Aspects	∑Tse	∑Tsh	V(%)	Criteria
1	Software engineering	1847	2080	88,8	Very decent
2	Learning Design	1887	2080	90,7	Very decent
3	Visual Communication	1887	2080	90,7	Very decent
	Amount	5621	6240		
	Average			90,1	Very decent

VI. SUGGESTION

Based on the research and development process that has been passed, there are some suggestions that can make learning media better, including: The development of this learning media is still limited to 3 competencies only. Therefore the need for further development related to competencies or other material content. There is the selection of the main character for the sex of the male or female. This is done so that users who are female can use characters according to their gender. The storyline and mission of educational games need to be developed again, so that users can play with enthusiasm and can be carried away in the atmosphere of the story in the game. Development of Knight Education games can be developed again on other devices such as smartphones to be more flexible and easy to use. In the learning evaluation, it is necessary to add more variations of the questions given. In addition, the presentation of questions also needs to be added again so it is not monotonous.

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