Mobile learning development of games based model using RPG Maker MV in ecosystem concept

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Abstract. The purpose of this research is to develop learning media based on mobile learning games model on biology learning that is feasible and practical to use. This research uses research approach and development approach (R & D) with model of development of ADDIE (Analyze, Design, Development and Evaluation). Media developed using RPG Maker MV software with learning materials of ecosystem concept. The data of research was collected using questionnaire for assessment by media expert, material expert, observation sheet, assessment sheet and concept of mastering test. The next data was analyzed qualitatively and quantitatively using SPSS v.21 software. Based on the results of research indicates that the media developed according to the assessment of media expert, material expert and user pertained feasible to used with high category. The result of activity observation and user response in learning using mobile learning model categorized by high means that most students focus and enthusiastic on learning. The results of the implementation of media usage measured from the mastery of student concepts show that mobile learning games model are able to increase the mastery of students concepts on ecosystem materials.

1. Introduction
The development of science and technology, especially in the field of information and communication technology has made it easier for all human activities in various fields such as in government, trade and education. In the field of education the use of information and communication technology as a supporter of teaching and learning process known as e-learning. Implementation of computer and internet usage in learning can be blended learning, multimedia, e-learning, mobile learning, e-library, e-book, e-journal, virtual learning, computer based test and others [1,2,3].

One of the alternative learning based on information and communication technology that is currently widely used and developed is a mobile learning tool. M-learning is a learning that is packed using mobile devices, M-learning refers to the use of mobile IT devices such as telephones mobile, laptops, PDA, tablet PC used in training, learning and teaching [4,5,6]. M-learning is part of e-learning based learning using mobile devices that can be accessed anytime and anywhere.

Mobile learning in this era using cloud computing where learning content can be accessed from various areas then incorporated in a website or application [7]. However, M-learning can be accessed offline and online. The offline version can be done and started only with one install, un-connected server (stand alone) only install engine, can be updated by connecting to the server, can interact with the learner or instructor, while the online version should be connected with the server online on internet network [8].
Many of the benefits of using mobile devices in learning can reduce distance and time, save costs, support distance learning, student-centered learning and reduce paper use. Mobile device apps (Apps) can be used as learning aids (for example, anatomy models of human organs for medical students) and students can access from anywhere [9].

The use of Smartphone as one of the mobile learning devices among learners on average is limited to games and social media. The large number of ownership of android Smartphone among learners and the prospect of increasing the number of the next few years is something that should be viewed as an opportunity for the development of learning media on Smartphone [10]. Seeing the potential and the enormous carrying capacity of the environment towards the development of mobile learning in learning, then this is necessary for real innovation so that the use of mobile phones can be useful in supporting the learning process, especially on biology subjects.

One of the software can be used in developing mobile learning games model is Role Play Games (RPG) Maker. According to [11] RVG Maker is a software maker Role game playing 2D made quite easy for everyone who uses it without having to have certain programming skills to run it. Research and development of learning using games has been done such as by [12,13,14]. Based on the results of research and development of mobile learning game model with RPG Maker software that has been done previously obtained a conclusion that the user is very enthusiastic and interested in learning that is packaged in the form of games, packaging model of learning with the game is also able to increase student interest to learn biology because it is packed in the form of an interesting game and challenge the students to try to level up and finish the game.

In this study developed mobile learning game model using RPG Maker MV, ecosystem concept selected as the material developed in the game assuming the concept of ecosystem has a high level of complexity covering several sub-discussion so that suitable to be made adventure game consisting of some level game that can train and honing creativity, problem solving and understanding of student concepts.

2. Method
This research uses research approach and development (R & D) by adopting model of ADDIE in [15]. Software used in the development of mobile learning games model is Role Playing Game (RPG) Maker MV and with ecosystem material. The data of research consist of questionnaire for media expert's appraisal, material expert, observation sheet and media assessment by students, and the question of mastering the concept of ecosystem material. The collected data was analyzed qualitatively and quantitatively using SPSS v.21 software.

3. Result and Discussion
Based on the results of research can be described that the stages of development of mobile learning model game media using the development of ADDIE consists of the following five stages.
3.1. Analyze
The first stage performed at the analysis stage is: (1) analyzing the learning objectives in accordance with the applicable curriculum, in this case the curriculum used is the revised of 2013 curriculum; (2) analysis of student characteristics include analysis of student learning style based on interview result with homeroom teacher and field observation, (3) media requirement analysis based on learning indicator to be achieved, and (4) analysis of learning materials.
3.2. Design
In the design stage, the step is to create a flowchart model game design using Visio 2010 software.
3.3. Development
Development stage begins with the making of storyboards and the making of supporting media such as text learning materials, images, game maps, and audio followed by programming using RPG Maker MV software.
Figure 1. Storyboard Mobile Learning Games Model Ecosystem Concepts

The storyboard design as in figure 1 above, then followed by programming using RPG Maker MV software presented examples of mobile games form the results of a readymade programming.

Figure 2. Home page Mobile learning games model Ecosystem Concepts
Mobile learning games model that have been developed can run on Windows and Android platform and can be downloaded on Google play store.

3.4. Implementation
Implementation stage through classroom usage is done by using one group of pretest post test research design [16, 17]. To know the results of the implementation in the form activity observation and student responses during the learning using mobile learning games model on the ecosystem concept is presented in Figure 4 below.

Based on Figure 4 above, it can be explained that the 90 minute student activities measured every 10 minutes shows average of the supportive learning activity (on-task) are 76% and the activities that are less supportive of learning are 24%. It can be concluded that most students focus on learning such as studying material, working on quizzes and completing adventures on games. The activities that include off-task such as joking, chatting, joking open applications other than games, the activity appears during the implementation process in learning.

Student’s response to the use of mobile learning game model in learning ecosystem concept is also very good, that is 82.89% give very good assessment to implementation of biology learning of ecosystem concept using mobile learning model games.

3.5. Evaluation
The results of the assessment of the feasibility of the mobile learning model game of ecosystem concept has been developed shows that the media is considered very feasible according to the assessment of media experts, material experts and users. The recap of the results of the assessment as follows.

<table>
<thead>
<tr>
<th>No.</th>
<th>Evaluator</th>
<th>Score</th>
<th>Feasibleness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Media Expert</td>
<td>3.46</td>
<td>very feasible</td>
</tr>
<tr>
<td>2.</td>
<td>Material Expert</td>
<td>3.52</td>
<td>very feasible</td>
</tr>
<tr>
<td>3.</td>
<td>User</td>
<td>3.74</td>
<td>very feasible</td>
</tr>
</tbody>
</table>
Based on Table 1, it can be concluded that mobile learning games model developed have high assessment consistency, which is classified as very feasible means that media have good quality as biology teaching media on ecosystem concept. The results of evaluation on mastery of students concepts on ecosystem material obtained picture as follows.

<table>
<thead>
<tr>
<th>Group</th>
<th>Average Score (Max. 100)</th>
<th>Normalized Gain</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pretest</td>
<td>Posttest</td>
<td>Score</td>
</tr>
<tr>
<td>High</td>
<td>64</td>
<td>78</td>
<td>0.39</td>
</tr>
<tr>
<td>Medium</td>
<td>46</td>
<td>78</td>
<td>0.58</td>
</tr>
<tr>
<td>Low</td>
<td>34</td>
<td>76</td>
<td>0.63</td>
</tr>
</tbody>
</table>

Based on Table 2 above, it is known that mobile learning games model on the ecosystem concept developed in this study are effective for all levels of students, especially in students with low initial ability.

4. Conclusion

Based on the result of the research, it can be concluded that mobile learning games model developed are very feasible to be used in biology learning of ecosystem concept, the result of implementation of mobile learning games model in biology learning of ecosystem concept shows very good response, and effective mobile learning usage in all groups of students especially students with low initial ability.

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