Development of Android-Based Mobile Learning on Ecosystem Materials to Increase the Interest in Learning Elementary School Students

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ARTICLE INFORMATION	ABSTRACT
  Author Correspondence: Asep Sunandar Education Administration Universitas Negeri Malang Semarang St., No. 5, Malang, East Java, Indonesia E-mail: asep.sunandar.fip@um.ac.id	The development of mobile learning ecosystem materials for elementary school students aims to produce a learning media that aims to support teachers in delivering learning materials in class while increasing interest in learning. Research and Development (R&D) is the research method used, and the Lee and Owens model is the development model used in this development. The results of this mobile learning development were validated by the validator with an average percentage of 94.5%. The results of this validation indicate that the resulting mobile learning is valid or feasible to use in the learning process in order to increase student interest in learning.

The process of providing education in this era has been influenced by the development of technology and science. One of these influences is the use of learning media in classroom learning practices, thus making technology an important part of the implementation of education. The development of technology and science is expected to encourage an organized and futures business with the aim of improving the quality of human resources, especially in the world of education and learning (Nudin, 2020). According to Suryawan & Permana, (2020) in the learning process, teachers are required to be able to attract the attention of students in the delivery of information to be provided so that students are maximal in receiving information submitted through learning media that has been prepared. The learning media used by students is expected to make it easier for students to achieve certain learning goals or competencies. Therefore, the learning process that takes place must be able to utilize effective learning media and adapt to the times (Purwanti, 2018).

According to Basori, (2017) Learning media is one of the components of learning resources that are important in the implementation of the learning process. Various forms and types of learning media used by teachers can be a source of knowledge for students. With the increasingly widespread advances in the fields of communication and technology, as well as the discovery of the dynamics of the learning process, the implementation of educational and teaching activities is increasingly demanding and obtaining learning media that vary widely (Shalikhah, 2017).

The development of the world of technology indirectly requires students to always follow existing trends, one of which is having a smartphone. Hardinata et al., (2018) stated that in this era of globalization and the challenges of 21st century education, the use of smartphones has become a necessitin the learning process. In fact, smartphones are only used to play music and access videos, play games, and access various kinds of social media and have not been able to be optimally used in helping the learning process (Sukamto, 2012).

According to Setyadi, (2017) there is a basic specification contained in a smartphone that can be used as an interesting and fun learning medium if filled with an application and educational content. Therefore, it is necessary to maximize smartphones into learning media that can help teachers in the learning process so as to increase interest and quality in learning. One of the efforts that can be done by teachers in maximizing the use of smartphones in the learning process is to develop learning media that can be accessed using smartphones.

In the world of learning, the use of smartphones for the learning process is known as mobile learning. Azmi, (2016) stated that mobile learning is an alternative to the development of practical learning media and allows students to learn anywhere and anytime. One of the considerations in developing smartphones into mobile learning media is the basis of the system used (Sidiq, 2020). The operating system is a link between applications and hardware so that users can carry out certain functions.

Based on a report entitled "Digital 2021" in Nafi'a et al., (2021) published by Hoot Suite and We Are Social, the use of smartphone in Indonesia reached 202.6 million at the beginning of 2021. This number increased by 15.5% or around 27 million people compared to January 2020. In reality, Indonesia has a population of around 274.9 million people. This shows that Indonesia's smartphone usage will reach 73.7% in early 2022. Based on this data, it is possible for developers or programmers to create various features of learning media applications that are accessed using smartphones, one of which is by using the Android operating system.

The Android operating system that supports the development of its applications is expected to produce representative mobile-based learning media (mobile learning). The resulting media is not only monotonous with text, but also contains elements of multimedia audio / visual elements and even animations that can make it easier for students to understand the material. For example, some materials in biology learning cannot be seen directly by students with the naked eye, so the role of media is needed so that students can learn the material more easily. The development of mobile learning is expected to facilitate the needs of students and increase interest in learning to learn the material.

METHOD

To be able to achieve development goals it is necessary to establish a development method. Lee and Owens' development model became the model used in the development process of mobile learning. The use of this development research model was chosen because in multimedia development this requires a lot of analysis. This development model has two stages of analysis, namely needs analysis and initial to final analysis.

In this development research model, evaluation can also be carried out at each stage of development, so that the shortcomings of the product can be immediately known, as well as the effectiveness of the time that can be reached to develop multimedia. In the research model, it has several stages that need to be carried out, namely (1) analysis, (2) design, (3) implementation / development (4) evaluation.
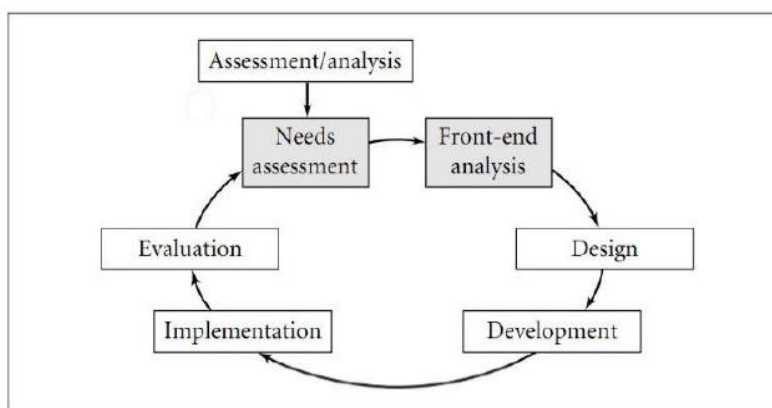
Figure 1. Lee and Owens Development Stage

Qualitative and quantitative data are the types of data in this research and development. Data in the form of suggestions for improvement, comments or responses given by media experts, material experts on the feasibility test is qualitative data in this research and development. Meanwhile, quantitative data was obtained using the help of a closed statement questionnaire that had been designed using a numbered scale of products assessed by media experts, and material experts as well as IP A subject teachers.

Interviews and questionnaires are instruments used to collect data. Interviews were conducted toassess the initial findings in the field. Meanwhile, to collect assessment data on the evaluation of the media tested to media experts and material experts as well as social studies subject teachers, questionnaires are used. The feasibility level of the product developed is the basis for the selection and use of questionnaires in this data collection instrument.

In this research and development, analytical techniques are used in analyzing research data, the analysis technique is descriptive analysis. The data that has been collected is then grouped into two, namely quantifiable data in the form of numbers and qualitative in the form of input and suggestions. Qualitative data from questionnaires analyzed through the calculation of the percentage of the number of scores of each item in all questionswere titative using the four-level Li kert scale. According to Arikunto, (2013) the formula for determining the percentage is:

$$P = \frac{\Sigma x}{\Sigma xi} \text{ X } 100\%$$

Description:
Q : Presentase kelayakan
Σ : Total overall score of validator answers
Σ : Total of all validator's highest answers

These qualifications are used to give meaning as well as to give a decision to revise or not the product developed can be seen in the following table 1.

Table 1. Eligibility Level Criteria

Presented (%)	Level of Validity	Eligibility Level
80—100%	Valid	No Revision Required
60—79,9%	Valid Enough	No Revision Required
40—59,9%	Less Valid	Needs Partial Revision
0— 39,9%	No Valid	Total Revision

The development procedure in this research and development with Lee and Oewns Model consists of several stages, namely among the following:

Analysis Stage

In this stage, interviews were carried out with class teachers related to learning natural science ecosystem materials as well as facilities and infrastructure that were able to support learning. According to the results of the interviews that have been carried out, it has resulted in the conclusion that learning media in ecosystem materials have never been made in learning in class six, therefore the importance of the existence of learning media as a means to support teachers in presenting, communicating and conveying material to students. In addition, it is also useful to increase learning motivation and interest in students in understanding the material presented.

Design Stage

Previous research literature studies and field needs show that it is necessary to design in the form of interactive multimedia media products that are developed into teaching aids in learning that are able to support teachers to communicate the material so that it is not difficult for students to understand and understand.

Development Stage

The preparation of materials in learning as well as learning evaluation tools will be carried out in this stage. The output result of this product is an android application in apk extension format. At this stage, the product is still a rough initial design, but the components in it have been compiled in full and as much as possible.

Implementation Stage

To find out the feasibility of the product being developed, it is necessary to carry out validation. The intended validation is to media experts and material experts, and the last one will be tested on students at the SD Laboratory of the Indonesian University of Education and the Laboratory Elementary School of the State University of Malang. This product validation aims to correct the weaknesses and shortcomings of the product in terms of the media and material, so that this product is able to become a good learning medium and increase students' interest in learning. As for the individual trial stage, the small group trial and the large group trial.

Revision/Evaluation Stage

The product improvement stage (revision) is intended to correct the weaknesses and shortcomings of the product developed after obtaining validation results so that this product is suitable for teachers to use in classroom learning activities.

RESULT

The products resulting from the development of mobile learning are then validated by media experts and material experts. The product from this development can be seen in the following figure 2.

Figure 2. Mobile Learning Development Products

The data validated by media experts covering several aspects in the development of mobile learning is presented in the following figure 3.
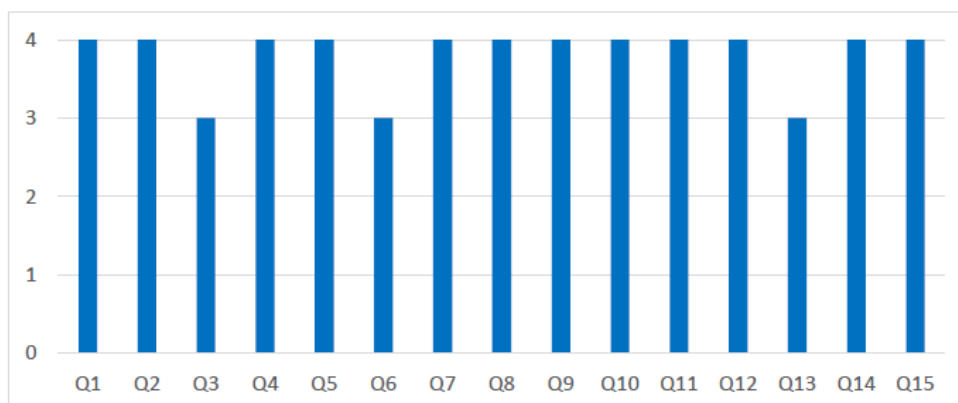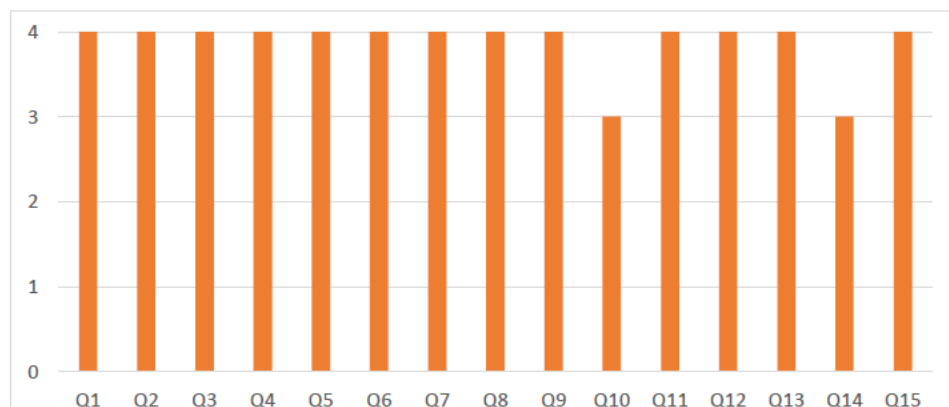

Figure 3. Media Expert Response Graph

Descriptive data analysis from media experts, namely Educational Technology Lecturers regarding learning indicators consisting of 15 aspects of questions related to media and material in the developed mobile learning. In the Media Expert response questionnaire on a value scale of 1-4, the media expert gave a value of (4) on: (Q1) The suitability of image selection; (Q2) Suitability of font types; (Q4) The attractiveness of colors and images; (Q5) Suitability of the background and font color; (Q7) The attractiveness of the media interface; (Q8) Ease of operation of navigation buttons; (Q9) The suitability of the musical background; (Q10) Suitability of the transition effect; (Q11) The suitability of animation; (Q12) Media usability/usability; (Q14) The precision of the sentence; (Q15) Clarity of the material. While in other aspects media experts give values (3) to: (Q3) Suitability of font size selection; (Q6) The appearance of the variation design; (Q13) The use of communicative language. Based on the established criteria, it can be explained that the development of Mobile Learning Ecosystem Materials for Class VI Elementary Schools meets the criteria by being feasibly implemented as a learning medium. Furthermore, validation is carried out by material experts by paying attention to several aspects in the development of mobile learning, which is presented in the following figure 4.

Figure 4. Material Expert Response Graph

Descriptive analysis of material experts, namely teachers of Natural Science Subjects regarding learning indicators consisting of 15 aspects of questions related to the material in the developed mobile learning. In the material expert response questionnaire on a value scale of 1-4, the material expert gave a value of (4) on: (Q1) Kmaterial conformity for class VI; (Q2) The conformity of the material to the characteristics of the student; (Q3) The suitability of the material with the junior high school curriculum; (Q4) Conformity of the material to the learning objectives; (Q5) Conformity of the material to basic competencies; (Q6) Conformity of the material to the concept of learning; (Q7) Collapse of matter; (Q8) The suitability of the use of animation with the material; (Q9) The suitability of the use of the video with the material; (Q11) Conformity of the material to the development of Natural Sciences; (Q12) Suitability of the level of language used; (Q13) The appropriateness of the use of time to do the questions; (Q15) The use of media uses case examples that help students solve problems of everyday life. Meanwhile, in other aspects, the material expert gives a value of (3) to: (Q10) The adequacy of the proportion of practice questions; (Q14) Media linkages to illustrations and sample questions in textbooks. Based on the established criteria, it can be explained that the development of Mobile Learning Ecosystem Material Class VI Elementary School meets the criteria by being feasibly implemented as a learning medium.

After validating the media to the validators, the trial was then carried out to the students. The uji coba conducted to students aims to find out their responses to the learning design developed starting from an individual trial that involves 3 respondents. After an analysis of individual trials, the test proceeded to a small group trial involving 3 groups with each group of 4 respondents. After an analysis of the individual trials, the test then proceeded to a broad trial involving 24 respondents or a full class at the Indonesian University of Education Laboratory Elementary School and the State University of Malang Laboratory Elementary School. The presentation of the data on the results of the trial to students is presented as follows:

Table 2. Data on Student Trial Results at SD Laboratory Universitas Pendidikan Indonesia

No	Trial	Number of Scores	Average percentage
1	Individual trials	255	90%
2	Small kel trial.	967	80%
3	Field trials	2158	90%

Table 3. Data on Student Trial Results at SD Laboratory, State University of Malang

No	Trial	Number of Scores	Average percentage
1	Individual trials	252	89%
2	Small kel trial.	968	81%
3	Field trials	2147	88%

Based on these results, it can be seen that the response to the use of the learning media that has been developed has a positive response from students in both elementary schools where the research trial is located. This can be inferred from the acquisition of an average score in field trials of 90% at the Laboratory Elementary School of the Indonesian University of Education and 88% at the Laboratory Elementary School State University of Malang. If the results of obtaining this data are adjusted to the eligibility level criteria, then this learning design is concluded in the "Excellent" criteria, so there is no need for revision. The analysis that has been carried out can then provide a conclusion that the learning design is final and there is no need for revision, so that it can then be applied in the learning process to increase the interest in writing learning for students.

DISCUSSION

Learning media can be said to be a form of implementing technological and communication advances, especially in the field of education. The use of interactive multimedia in learning activities can increase student activities and memory while being able to save time (Puspitarini & Hanif, 2019) . Furthermore, Liu et al., (2014) explained that the use of mobile learning in learning is very good because it is able to provide opportunities to communicate information so as to develop student skills, and be able to improve learning activities for students.

According to Drigas & Pappas, (2015) The learning process through mobile learning has been proven to be able to support subject teachers in delivering learning materials, because they are presented with various methods. The improvement of student learning outcomes is expected to be because students feel like and encouraged in understanding the material of technological advances, this is because the material presented is interesting and interactive through software in computer applications that have been compiled for these learning activities. According to (Munir, 2015) there is an alternative to be able to improve the quality of student learning in the classroom, there is the use of learning media.

The results of the research above have shown that mobile learning in learning activities is able to increase the interest and learning outcomes of students according to material experts, media experts, as well as teachers of natural science subjects. Mobile learning allows students to repeat ecosystem materials at the time of learning, and this is able to have a positive impact. Furthermore, Demir & Akpinar, (2018) stated that in learning through mobile learning, it is possible for students to repeat the material that has been presented or explained.

The role of media in learning can be said to be important because it is able to support teachers in delivering learning in the classroom and helping learning success. Williamson et al., (2019) stated that the media is an integral part in teaching and learning activities and not only as a tool in teaching. This is supported by the statement that the ability of teachers in choosing and designing learning affects the media that is integral in learning (Rahayu & Solihatin, 2019). In addition, the research of Alhafidz & Haryono, (2018) proves that there is an increase in learning outcomes by students due to the use of mobile learning. This is because learning media in the form of mobile learning is able to contain images, animations, writing, sound and video. When used to wrap a learning material, the result is that the material looks more real and interesting so that it can make it easier for students to understand it.

Pereira & Rodrigues, (2013) stated that mobile learning is a learning model that adopts the development of cellular technology and smartphone devices that are used as a learning medium. Therefore, the use of mobile learning is considered appropriate if applied to learning in the present and in the future. In addition, mobile learning is able to create two-way interactions, namely between media and users so that users are not easily bored (Kumar & Mohite, 2018).

The development of mobile learning is said to be able to support teachers in learning and teaching activities in the classroom. This statement can be judged from the results of data on the validity or feasibility of the media to be used in the learning process. With a result of 98% by media experts, and 91% by material experts so that the product from this development is declared feasible without improvement. Furthermore, media trials conducted on students processed 90% of the results at the Indonesian University of Education Laboratory Elementary School and 88% at the Indonesian Education University Laboratory Elementary School. This shows that the product that is carried out has advantages and is able to be used for the learning process. In addition, a high level of validity indicates that the multimedia developed has a uniqueness, and a novelty that is different from the previous learning media or design (Nafi'a et al., 2022).

CONCLUSION

Based on the validation results tested against material experts and media experts, the results were obtained that the product developed was declared valid or suitable for use. It is based on the acquisition of a feasibility score by media experts with a total of 98%, material experts by 91%. The overall validation results had an average percentage of 9 4.5%. In addition, trials conducted on students at the two elementary schools where the test was tested received 90% and 89% results. Based on the criteria that have been set, the development of a mobile learning ecosystem in natural science learning for elementary school e nam grade students is declared feasible or valid. So that the mobile learning that has been developed can be used in learning activities in the classroom in order to increase students' interest in learning.

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