THE DEVELOPMENT OF SCIENCE LEARNING MATERIALS BASED ON MOBILE LEARNING (ANDROID) AT ELEMENTARY SCHOOLS IN WEST JAKARTA AREA

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Abstract

This research is motivated by Student's interest in smartphone. The use of smartphones in learning science becomes a solution in the learning process. Where the science learning process aims to develop critical thinking skills through mobile learning media. This research aims to develop products in the form of science learning materials based on mobile learning (android). The method used is research and development (R&D). Data is collected by means of data collection, planning, product development, validation and trial stages. The study was conducted at three Elementary Schools in West Jakarta, namely SDN Sukabumi Utara 07, SDN Sukabumi Utara 08 and SDN Sukabumi Utara 09. The objects developed were science applications based on android applications in fifth grade Elementary Schools. The first trial results from three schools are test results according to Student responses resulting in 90.8% which means the clarity of the material, the ability to motivate, attractiveness, and ease of use of teaching materials are appropriate for Students to use. The second trial result is the test of science subjects getting 83.3% which shows the level of validity of teaching materials is very good. The conclusion is that android-based science teaching materials are appropriate to be used and applied.

Key Words : *Mobile learning, Teaching material, Science.*

Introduction

The life world of children in the 21st century is faced with challenges and demands for mastering technology and information, intelligent and skilled in social relations in the era of globalization, and competent and meticulous in utilizing natural resources whose availability is increasingly limited. Padu (2012) states that the use of nature for the benefit of human prosperity ultimately faces a challenge that is the depletion of natural resource supplies. Massive utilization of natural resources without considering regeneration and efficiency will accelerate the occurrence of natural resource crises. If the crisis occurs then the best way is to do efficiency, recycle, imitation or find replacement sources. Such work is only possible by superior human resources, those who master science and technology, have values, respect for nature in relation to life.

Technology plays an important role in people's lives. In this day, almost all jobs use technology. Technology turns into a primary need that cannot be abandoned by most humans. Therefore, human resources themselves must realize that technology plays an important role in all activities. The public must realize that this digital era is very important for the present and future that can be called a digital revolution. Inevitably we must change our views and adapt from the traditional to the modern by using technology. One of these changes can be made in the world of education that starts from the learning process.

Technology is a medium that supports the current curriculum. Where teachers are encouraged to be able to develop professionalism through their creativity in creating better learning than in previous years. This creativity is not only in terms of creating strategies and learning methods that are more interesting, meaningful, and fun, but also in providing more varied and functional learning facilities to be able to support the smooth and successful learning of learners, one of which is the use of technology.

Utilization of technology can be applied to all lessons. One of them is science. Understanding of scientific concepts should be done through scientific processes. The experience of doing the science process from the age of children will provide a foundation for the mastery of science in further education. Semiawan, et al (1985) that mastery of the scientific process is very important for a number of reasons, namely: (1) the development of science takes place so fast that it is no longer possible to teach facts and concepts to students, (2) students will more easily understand the concepts more abstract if learning through concrete objects and directly do it yourself, (3) scientific discoveries are relative truths, because the theory that is considered to be true today, is not necessarily true in the future if the theory is no longer supported by scientific facts, (4) in the learning process concept development cannot be separated from the development of attitudes and values (Hamer, et al., 2017), then the process skills become a vehicle for linking concept development, attitude and value development. Therefore, with the many expected scientific processes, the technology is expected to encourage students to understand the material with fun.

In Indonesia, smartphone usage is included in the "top five" ranking of gadget users, especially smartphones (detikINET, 2014). In addition, a survey conducted by Hottest Insight in liputan6.com (2016) shows that 40% of children in Indonesia are technology literate, or also known as active internet users. Specifically, 63% of children already have a facebook account, which is used to update status, play online games, and upload photos; 9% of children already have a twitter account; and 19% of children are actively involved in playing online games on the internet from their gadgets.

But along with technological advances and the number of smartphone users in Indonesia is inversely proportional to the use of smartphones that are not optimal, especially in the world of education. Among students themselves smartphones are mostly only used to access social networks such as Instagram and Facebook and have not yet taken an important role in education. Whereas in elementary students, smartphone is often used to play games.

Based on the facts above, it appears that students are very interested in technology. It's just that many actors in the world of education are still less aware that the high opportunities for the use of this technology to maximize learning. But lately a lot of education has started based on the use of technology for the learning process that we often hear is e-learning (distance learning). After the development of e-learning became a common thing for educational institutions, then mobile learning emerged. E-learning is only limited to websites that take time to be accessed by students, while mobile learning can be accessed anytime and anywhere and always in the grip that can be used whenever. It is also supported that the growth of cellular internet is 8x greater than the growth of PC-based. (Adkins, 2008). Mobile devices are a cheaper alternative compared to traditional e-learning devices such as PCs and Laptops (Master, 2004). This is supported by research in Japan which emphasizes that interactivity in content seems to make teaching methods superior when compared to using web pages to deliver material.

The development of information technology allows students to independently seek learning resources from books, the internet, and others and continue to actively develop their creativity. Therefore, the manufacture of android-based science teaching materials is thought to be a solution in maximizing the learning

process. Android-based teaching materials are learning resources that are packaged in an interesting way that is applied to android smartphones.

Research Methodology

The method used as an approach in this research is research and development (R&D) education. Borg and Gall (2007) define R&D as a process used to develop and validate educational products, in the form of a cycle of steps consisting of: (1) studying findings relating to the type of product to be developed, (2) develop the product based on the findings, (3) conduct a field product test in the setting where the product will be used, and (4) revise weaknesses found in the field test.

This research was conducted in 3 (three) elementary schools in West Jakarta, namely SDN Sukabumi Utara 07, SDN Sukabumi Utara 08 and SDN Sukabumi Utara 09. The reason for choosing was that the condition of the school could be categorized as representative representing Elementary School in general, meaning that the school was a schools that are heterogeneous in terms of the socioeconomic background of student's parents. The representatives of these schools were chosen because they considered the environmental factors of the school, the teaching staff and supporting facilities that made it possible to carry out research.

Findings and Interpretation

The stages in the development of teaching use the Dick and Carey's procedural model. The procedural model is a descriptive model, showing the steps that must be followed to produce a product. Procedural steps include: 1) collection of initial data; 2) planning; 3) product manufacture; 4) initial trials; 5) product improvement; 6) field trials; 7) improvement of operational products; 8) conclusion of trial results. As for more details, these steps are described below:

Collection of Initial Data

This stage is done by identifying the estimated needs, studying the literature and researching on a small scale, the instruments used are questionnaires and research on a small scale. The instrument used was a questionnaire in the form of answer description. Initial research was conducted at SDN 07 Sukabumi Utara which involved 10 students. Respondents are 5th grade students at SDN 07

Sukabumi Utara. Initial research was conducted to obtain information on student needs. This information is used as a guideline for developing mobile learning-based teaching materials. The purpose of this stage is to establish and define learning requirements. From the results of preliminary observations made at SDN 07 Sukabumi Utara, several problems were found related to science learning: 1) communication in the classroom only occurred in one direction, meaning that students only listened to the lecture teacher, 2) almost all students were able to use and also have smartphones, which used only to play games, 3) the use of teaching materials based on mobile learning in class has never been used, 4) students are less motivated in learning science because it is considered difficult and boring, and; 5) the use of media in class is very rarely done by teachers in the science learning process.

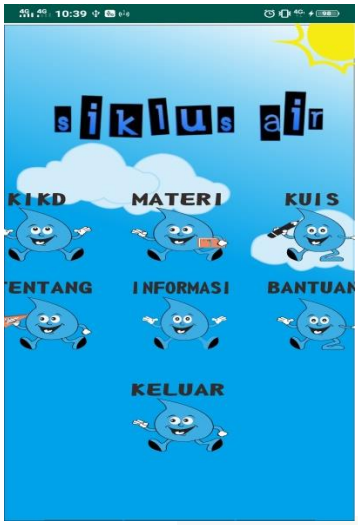
Planning

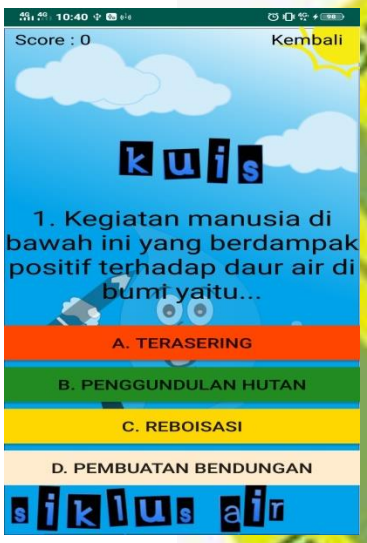
The purpose of this product is to increase student's knowledge and understanding of science learning. In general, the purpose of the material is students are able to understand and explain the process of the water cycle. This goal is based on the basic competencies specified in the curriculum. By making teaching materials based on mobile learning that are interesting and easy to use, it is hoped that students can learn effectively

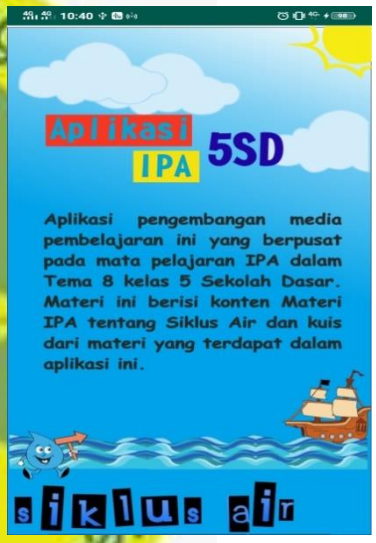
The results of the development are in the form of science learning materials based on mobile learning (android) which contains learning material for one material. An innovative aspect of mobile learning (android) based science teaching materials is the existence of applications that can be used as learning resources. Applications that are integrated in science-based mobile learning (android) raise authentic themes based on student's needs in the learning process. The role of science-based mobile learning (android) is to motivate students and help make it easier for students to understand the contents of learning materials.

Product Manufacture

The results of the development of science learning materials based on mobile learning (android) are presented in applications that can be accessed via android. As for some applications as in the picture below :







The menu in the development of android-based science teaching materials, namely: 1) KIKD, contains content and basic competencies; 2) material, the material contained in this application is the understanding of water, water cycle, short water cycle, medium water cycle, long water cycle, ground water cycle, water effect and preservation. 3) quiz, contains questions that must be filled from the material that has been described. 4) about, contains the author or developer of an Android-based Science teaching material application. 5) information, in the form of information about the application. 6) help is a menu containing information about the application menu. 7) exit, is the finished menu and exits the application.

Initial Trial

Initial trials conducted at SDN Sukabumi Utara 07, the results of the assessment of all respondents, amounting to 10 people, the student's responses in assessing the android application of science subjects were considered to be in very good category. This can be seen from the average answers of all respondents =4.78 in the interval class >4.2 to 5.0 (very good classification). Thus based on the results of the questionnaire, student's responses in assessing the android application of science were considered very good. Suggestions given by students in the science android application are clarified sound, increased material, animation can move better, use more colors and multiply the question material.

Furthermore, the results of the questionnaire assessment on the fifth grade teacher for their response in evaluating the android application of sciences amounted to 4.167, which means it is included in the excellent category. The mean value of 4.167 entered into the interval class >4.2 to 5.0. Then according to the teacher that the science android application is feasible to use with the advice given is more expansion of the material in the material and more questions contained in the quiz menu.

Product Improvement

Product improvement is done through validation which is divided into three aspects, namely material experts, linguists and evaluators. Material expert validation received a questionnaire value of 4.44, which means it was in the very good category. The average value of 4.44 is included in the interval class >4.2 to 5. According to the material expert, the science android application is feasible to use with the suggestion that animation is better to move to show the water cycle.

Furthermore, the second is the validation of linguists with a questionnaire value of 4.44, which means it is classified as very good. The average value of 4.44 goes into the interval class >4.2 to 5. According to linguists, the science android application is already feasible but it still needs to be fixed in the content especially the words being cut off on the screen.

Finally, the evaluation validation has a 4.25 result, which means it is categorized as very good. The average value of 4.44 is included in the interval class >4.2 to 5. According to the evaluation expert, this application is feasible to

use with the suggestion to multiply the material in explaining the water cycle in each selected menu.

Thus the expert validation data that has been distributed, then the conclusion this application has been very good with an improvement that must be developed again. This is done so that this application is more effective in its use in learning.

Revisions made based on the validity above include: 1) correcting the words cut off on the screen 2) multiply the material in explaining the water cycle in each selected menu; 3) expansion of material and addition of practice questions, 4) sound is clarified and colors are brighter; 5) better animation moves to show the water cycle.

Field Trial

Trials were conducted at 3 schools. Small group test results (student responses) at the 1st school show the level of validity of teaching materials is very good, with the acquisition of a percentage of 95.6% each, and these results mean, material clarity, ability to motivate, attractiveness, and ease of use of materials teaching is feasible to be used by students. Subject teacher test shows the level of validity of teaching materials is very good, with a percentage of 83.3%.

Small group test results (student responses) at the 2nd school show the level of validity of teaching materials is very good, with the acquisition of each percentage of 88.4% and these results mean, material clarity, ability to motivate, attractiveness, and ease of use of materials teaching is feasible to be used by students. Subject teacher test shows the level of validity of teaching materials is very good, with a percentage of 84.4%.

Small group test results (student responses) at the 3rd school show the level of validity of teaching materials is very good, with the acquisition of each percentage of 88.4%, and these results mean, material clarity, ability to motivate, attractiveness, and ease of use of materials teaching is feasible to be used by students. Subject teacher test shows the level of validity of teaching materials is very good, with a percentage of 82.2%.

Improvement of Operational Product

The results of the questionnaire assessment on the fifth grade teacher for their responses in evaluating the android application of science amounted to 4.167 which means that it is included in the excellent category. The mean value of 4.167 entered into the interval class >4.2 to 5.0. Then according to the teacher that the science android application is feasible to use with the advice given is more expansion of the material in the material and more questions contained in the quiz menu.

Furthermore, the results of the questionnaire assessment on the fifth grade teacher on their responses in assessing the android science applications are 4.2, which means that they are categorized as very good. The mean value of 4.2 entered into the interval class >4.2 to 5.0. Then according to the teacher that the science android application is feasible to use with the advice given is the expansion of the material and the addition of practice questions.

Furthermore, the results of the questionnaire assessment on the fifth grade teacher on their responses in evaluating the android application of science are 4.11, which means that it is categorized as good. The average value of 4.11 entered into the interval class >3.4 to 4.2. Then according to the teacher that the science android application is feasible to use with the advice given is more interesting images if the animation can move.

Thus, the responses of students from these three elementary schools were averaged to get a score of 4.54 which meant that it was in the very good category. The average value of 4.54 entered into the interval class >4.2 to 5. These results prove that the student's response in using this application is very good, so it is expected that this android application can make effective learning of science in the classroom or outside the classroom.

Furthermore, the validation conclusion of the material experts ie teachers from these three elementary schools got an average result of 4.17 which means it was in the good category. The average value of 4.11 entered into the interval class >3.4 to 4.2. This concludes that the science android application is already good and as for suggestions that will make it included in the development of this application for the future.

The results of the expert validation of the teacher's material from the three elementary schools get an average result of 4.17 which means it is in the good category. The average value of 4.11 entered into the interval class >3.4 to 4.2. This

concludes that the science android application is already good and as for suggestions that will make it included in the development of this application for the future.

Conclusion of Trial Result

The results of small group tests (student responses) at three schools can be concluded the validity of teaching materials is very good, with the acquisition of an average percentage of 3 schools that is 90.8%. This result means that the clarity of the material, the ability to motivate, attract, and ease of use of teaching materials are appropriate for students to use. Subject teacher test at three schools shows the level of validity of teaching materials is very good, with an average percentage acquisition of 83.3%.

Conclusion and Suggestion

Based on the results of the study it can be concluded that: (1) teaching materials based on mobile learning (android) that are developed obtain appropriate assessments from educational experts, (2) students are able to understand each material displayed in the android application well after utilizing teaching materials it is known from the results obtained 90.8%, (3) The use of Android-based teaching materials that are developed effectively based on student learning outcomes.

Suggestions that can be given from the results of research are, (1) teachers can utilize teaching materials that have been developed to support student learning activities that can help him deliver the material individually, (2) the development of teaching material products not only develops from one subject, but several subjects so that students better master all subjects, (3) further research needs to be done to find out the effectiveness of mobile learning teaching materials (android) more broadly, (4) each teacher has the facility to continue working and provide complementary learning, so teachers can develop teaching materials with these facilities.

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