Android based mobile learning as one of instructional media for science materials in the 21St century

by Senam Senam
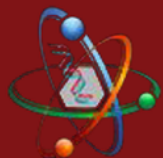
ANDROID BASED MOBILE LEARNING AS ONE OF INSTRUCTIONAL MEDIA FOR SCIENCE MATERIALS IN THE 21ST CENTURY

Qamariah[1], Jumadi[2], Insih Wilujeng[3], Senam[4]

[1]Graduate Student of Science Education, Yogyakarta State University
[2]Department of Physic Education, Yogyakarta State University
[3]Department of Science Education, Yogyakarta State University
[4]Department of Chemistry Education, Yogyakarta State University
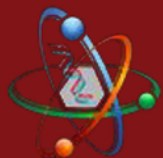Yogyakarta, Indonesia
[1]E-mail : qamariah.may@gmail.com

Abstract – Android based mobile phone is technology which developing rapidly and dynamically. User of android based mobile phone have been increasing every day. The increase was due to some profit for user, such as easy to acces and many features like computer. It does not possibility that mobile phone can used in learning process. One of the benefits mobile phone for education as instructional media that be know as mobile learning. Mobile learning can facilitate learning both in the classroom and outside the classroom that can be accessed anywhere and anytime. The use this instructional media can be support learning process which recommended in the XXI century, which students are asked to learn independently without ignore the technological advances. The purpose of this paper was to determine the extent of android based mobile learning has been used as instructional media for learning science and support as one of the media that is recommended in this XXI century. Literature obtained such as journal, results of research, book, and articles was explained that mobile learning based android can support student learning, especially learning science material related to natural phenomena. By using the mobile learning based android some natural phenomena can be described and explained more detail, so that students more easily understand the subject matter.

Keywords: Mobile Learning, Android, Instructional Media, The 21st Century

I. INTRODUCTION

Education in the XXI century is characterized by an emphasis on a wide variety of skills that must be possessed by students, these skills are: 1) life and career skills, 2) learning and innovation skills, and 3) information media and technology. Life and career skills include flexibility and adaptability, initiative and self-direction, social and cross-cultural skills, productivity and accountability, as well as leadership and responsibility. Learning and innovation skills include creativity and innovation, critical thinking and problem solving, and communication and callaboration. Information, media and technology skills include information literacy, media literacy and ICT literacy. All of these skills will not trained easily without applying teaching and learning process appropriate, whether it is from the selection of methods, models, and even instructional media used. XXI century education emphasizes on the use of scientific methods in any models applied learning in the classroom. Through the scientific method inductively students learn to solve problems that appear just like a scientist, so that students can learn actively and more meaningful in understanding a given subject matter. Selection of appropriate learning models merely is not enough to train a wide range of student skills as expected, the selection of instructional media as a means of student learning is also important. Science is one of the subjects who learn about nature in a systematic also emphasized the achievement of XXI century skills, therefore, such a study should require collaboration in the selection of methods, models and instructional media. Studying science means learning everything related to daily life, science learning resources is not only available at the school or in the classroom, but also in the environment. Therefore it requires the appropriate learning resources that students skills can be trained to maximum. One of learning

source that would learn science and in accordance with the progress of science and technology is use of instructional media mobile learning.

A. *Learning Science*

Science is an organized body of knowledge about nature, it is the product of observation, common sense, rational thinking, and brilliant insights [1]. Science is knowledges or set of concepts, principles, laws, and theories are formed through a process of creative and systematic. Learning science through inquiry, followed by the observation process (empirical) continuously. Science is a human effort that includes mental operation, skill, and strategy to manipulate and calculate which may be tested again the truth and based on the attitude of curiosity (curiousity), strength of the (courage), perseverance (persistence) were carried out by individuals to reveal the secrets of the universe [2].

In learning science, students are directed to act like a scientist using the scientific method to find answers to the concerns raised by a teacher. Learning science using science process skills approach that is divided into basic skills and integrated skills. Science process skills focused on the mindset of scientists in building the knowledge, ideas, information, and communication. These skills can certainly equip students to solve problems, learn on their own, and can appreciate science [3]. There are three elemants of science: processes or methods, pruduct, and human attitudes. Processes or methods such as: investigating problems, observing, designing, and carrying out experiments, evaluating data, measuring, and others. Products such as: fact, principles, laws, theories. Human attitudes such as: beliefs, values, and opinion [4].
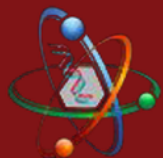
B. *Instructional media*

Instructional media is one very important component in the learning process, which became one of the alternative strategies are effective in achieving the learning objectives [5]. Application of media in the classroom can not be separated from the development of science and technology. Media that initially only form only audio or visual, gradually developed into a medium of audio-visual learning. Teachers can incorporate media based visual, audio and kinesthetic convey a subject matter, the incorporation of a variety of media is intended for students with a wide range of modalities can absorb the information conveyed to the maximum [6]. The combination of a wide variety of instructional media is what lies behind the emergence of multimedia. In general, multimedia is the use of multiple media to convey information in a variety of combinations, such as include text, graphics, animations, images, video, and sound. Multimedia project allow students to focus on course content like promote active and cooperative learning, engange students in higer order thinking skills, present and represent the idea though variety of media, manipulated various technology tools on screen objects and information models, locate and determine the best tools and resources for gathering and producing information, crictically analyze, evaluate, and organize information [7].

C. *Android based mobile learning*

One example of multimedia learning emerging today is mobile learning, we known as m-learning. M-learning is a portable media that can be applied on a smartphone. Smartphones use android system, iOS, or Windows Phone. The benefits of the use of mobile learning is: (1) a relatively low cost compared to using a computer or laptop, (2) multimedia fun with a variety of options, (3) continuous and supportive learning situation, (4) decrease in the cost of education, (5) have potential to create a learning experience comes more meaningful, (6) promote literacy, and participation in education from various circles, (7) using the communication features of a mobile phone as a part of the learning activities such as sending media or text in a file portfolio [8]. Mobile learning is one of innovation that supports education policy world of lifelong learning, which can be done without having to be in school. Mobile learning is an instructional media that is connected with the connection of learning resources both online and offline, so as to increase knowledge anywhere and anytime [9].

According Sugiyarto breakthrough for the development of mobile learning even easier with their varoius way smartphone or usually referred to by smartphone [9]. Based on data from the Statistics Portal shows that smartphone sales in 2015 was 81.61% for the android system, 15.89% for the IOS system, 1.88% for the system microsoft, 0.31% for RIM system, and 0.32% for other systems [10]. This shows that the smartphone with android system more widely used among the community. Android is an operating system for linux based mobile devices that includes an operating system, middleware and applications that provides an open platform

for developers to create applications [10]. Android devices combined with a sell more than windows, iOS, and Mac OS devices combined, with sales in 2012, 2013 and 2014 closer to the installed base of all PCs. On July 2013 the Google Play Store has had over one million android apps published over 50 billion apps downloaded [11]. There are many applications relating to media with a wide range of scientific disciplines, mathematics, language, history, science, and others. One form of the optimization the smartphone operating system android is fast program operation and special features a touch screen can be utilized in making a decent learning applications for user [12].

The learning process by using android based learning media can be easily implemented. Android operating system to run on mobile devices is easy and available without coast, Thus making of android application and a simple installation. Also available are many applications that contain learning material is constantly evolving and can be easily accessed by students. For example, students can download and practice short test or quizes on mobile phone where they prompt feedback is instantly displayed to improve comprehension [13].

D. Android based mobile learning in science education

Mobile technology provides a variety of learning experiences that enable children to make connections based on what they observe, collect a variety of information, and access it at anytime, anywhere, and with anyone [14]. Mobile learning has students in classrooms often working interdependently, in groups or individually to solve problems, to work on the project, to meet individual needs, and to allow for students of voice and choice [15]. Using mobile learning raises new experience in learning that feels quite different from conventional computer based learning system, known as e-learning. Basically, the technology oriented approach allows the achievement of the three pillars in learning activities, namely: individual, collaborative, and situated learning [16].

II. RESEARCH METHOD

The method used in this paper is the method of literature. The literature used include books, journals, and articles. The paper is expected to be used as a resource for other writers, especially for studies related to the instructional media android-based mobile learning.
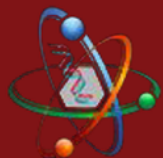
III. RESULT AND DISCUSSION

Table 1. are shows some results of research on the development of instructional media such as mobile learning. The research obtinable from some literature.

TABLE 1. SOME RESUTLS OF RESEARCH ABOUT ANDROID BASED MOBILE LEARNING

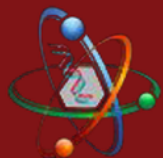| No.	Title	Year	Author
1	The developtment virtual physic laboratory application "ViPhyLab" based on android smartphone to improve the learning independence and conceptual understanding of rotational dynamics for senior high schiil students	2016	Fitria Suci Arista
2	The developtment an android assisted electronic module to improve critical and creative thinking skills of class XI students	2016	Prabawati Budi Utami
3	The developtment of interactive multimedia based android on hydrocarbon compound try as chemistry learning for X grade senior high school	2015	Nursetya Danusaputra
4	The developtment of android game "chemist to be a millionaire" as learning media on chemical bonding for senor high school grade X	2015	Febry Kurniawan
5	The developtment of android mobile learning with app inventor as learning media for students of SMP/ MTs on VII grade	2015	Arnanda Setyawan
6	The developtment of android based media CAI in sciences subject structure and function of plants metworks to grade VII SMPN 1 Tambelang Jombang	2014	Dian Saiful Adiatma
7	The developtment of android based media CA in science subject material optical instruments subject eye for class VIII SMPN 1 Plandaan Jombang.	2014	Muhammad Hafiz Yusuf Annasas dan Danang Tandyonomanu

Arista make instructional media called the ViPhyLab an android based mobile learning. It can be used for learning everytime and everywhere, contain subject matter explanations, virtual laboratory, exercise, and interactive media display. Validity of ViPhyLab are very decent regarded as a media of learning. There is an improvement of the students learning independence after using the ViPhyLab with p-value <0.05, p-value =

0.000. There is an improvement of students conceptual understanding of the dynamic rotational after using the ViPhyLab with p-value<0.05, p-value=0.000 [12]. Utami conduct research of instructional media development. He developed instructional media is an electronic module android assisted physics. From the media aspects and matter aspect shown about the products is very good category. The results of research also show that there are differences between the experimental class and control class with significance <0.05, it's describe obut the electronic module android assisted physics can improve critical thinking skills and creative learners [17]. Danusaputra has developed an interactive multimedia android based on the material hydrocarbon compounds. Based on the evaluation the reviewer, who created the interactive multimedia included the excellent category with ideals percentage of 95%, so the android based multimedia can be declared fit for use as a media of learning and self learning resources [18]. Kurniawan has developed games android, it called chemist to be a millionaires as a medium of learning materials chemical bonds. Based on the assessment of the reviewer found that the developed learning media is very good category with a percentage of 86.4% ideals. Based on the assessment of student learning media included in both categories with a percentage of 80% ideals. Thus, this learning media can be declared fit for use. Students stated that instructional media to be a chemist millionaires an interesting learning media, loving, and increase interest in studying chemistry [19]. Setyawan has developed an android application mobile learning as a medium of learning science. The quality of android mobile learning applications that are developed in very good category, while the response of students to these applications included in the excellent category with percentage of 90.97% ideals. Thus android mobile learning application that was developed was declared fit for use as a medium of learning [20]. Adiatma has developed android based media CAI on material structure and function of plant tissues. Individual test results are categorized very well with a percentage of 91.18% value, great kelomok test results are categorized very well with the percentage value of 91.91%, and the test results of a large group very well categorized by perentase value of 89.95%. Products developed obtaining excellent category, both media expert validation and validation. This shows that the developed learning media declared eligible or can be used as a instructional media [21]. Annasas and Tandyonomanu has developed an android based CAI media with material optical instruments. The products developed have been validated and tested in class VIII SMP 1 Plandaan Jombang. The results showed that the learning media can improve learning outcomes expressed students with $t_{count} > t_{table}$, it is 2.393 > 2.000 [22].

Emphasis achievement against some of the skills that must be possessed by the student makes a teacher or learning developer must be more active in creating innovative learning process. One example is to develop a wide range of learning media as has been done by some researchers that are shown in Table 1. Instructional media created is based instructional media technology, the use of mobile phone based on Android. According to Rosenberg the development of science and technology led to friction in learning, namely: (1) from training to performance, (2) from the classroom into anywhere and anytime, (3) from paper to online, (4) of physical facilities to network, and (5) of the cycle time to real time [23]. The best instructional media is media support the classroom for learning process, with the result that information relating to the subject matter can be delevered for students. Each student in the class has a different learning style, such as learning style of visual, auditory, reading-writing, kinesthetic, or combination of all. The different learning styles of the students' cause a teacher should be more careful in using or choosing instructional media, especially for subjects that usually requires a visual aid. Science is one branch of knowledge that closely related with our lives. The object of the science is not only concrete that can be studied directly, but also is abstract that can be studied with visual aid. In learning science to describe something that abstract material has needed help use appropriate instructional media. Instructional media that would appropriately used are media that includes multiple learning styles of students, such as used instructional media android-based mobile learning. Today, childrens are already familiar with the use of smartphones based on android, and everyday almost never out of life. Teachers or educational technologist should use this media as a instructional media for students. Thus, students with different learning styles can learn anywhere and anytime.

Development of several android based learning applications on materials science, it show in Table 1, it is describe fact about android based mobile learning can be used as instructional media that can improve student learning outcomes. Android based mobile learning independently support the learning process for their students, because students are using this media can be learn anywhere and anytime. One application learning on android based mobile learning not only can display materials science, but also can display education game

and video for learning. Video games are existing in the android based mobile learning is usually a set of questions or a problem that deliberately presented by the developer to train thinking skills of students. The end of each game, students will be given score that directly visible, so students can determine the extent to which they understand of the material. Beside that, science material that is abstract can be explained by using video. Some materials of science can not be observed directly using the sense. For example explain material science of solar system. Conventional learning usually explained this material or used visual aid in the classroom. Students were told to imagine "what are explained by teacher". Learning materials science like that is not apply learning with scientific method and just learned while in the school, so that the XXI century skills of students are not trained well. Using android based mobile learning can resolve this problem. Explanation of abstract material can be helped by using video. Developer of android mobile learning can be apply step by step of learning model with using scientific method, so that students can learn with though step by step of scientific method. Therefore students can train the XXI century skills, in other that using android based mobile learning make students technology literacy.

IV.   CONCLUSION AND SUGGESTION

As a teacher and educational technologist is important to develop or using instructional media that takes into account learning style of students. Instructional media appropriate and demands of the times is android based mobile learning. Using android based mobile learning, students can learn everywhere and everytime. Therefore, equalization internet network needs to be done, so that students can more easily to access this media. Research or depelovment of android mobile learning is indispensable to support the adequacy of instructional media in education. Some research has been done can be reference for researchers or other authors.

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