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Android-Based Mobile Learning in Genetics Subject

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Abstract

The use of ICT-based learning media can make learning more effective. One of the ICT-based learning media that can be used as a learning medium that is operated on a smartphone device is mobile learning (m-learning). M-learning is developed with a multimedia format that provides text, images, audio, and video. The ease of internet access through cellular phone devices such as blackberries, iPhones, PDAs, and smartphones makes it easier to make learning applications using an Android-based system. The results of developing learning media based on android mobile smartphones show that student's motivation and learning outcomes increase. Learning media based on an android mobile smartphone is produced as a supplement to the Genetics course. Learning media based on an android mobile smartphone is a positive impact and a breakthrough from ICT advances to improve the quality of learning.

Keywords: learning media, mobile learning, android, Genetics subject

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Introduction

Learning is a process of interaction between humans and their environment so that attitudes change for the better. Various factors affect the interaction process, namely internal factors that come from within students and external factors that come from the environment. Lecturers/teachers are tasked with conditioning the environment to support behavior change (Mulyasa, 2008). Learning aims to focus on direct learning experiences through the development of process skills and scientific attitudes. Learning can be carried out well wait

for interesting learning between lectures and students. Success in achieving learning objectives is strongly influenced by several factors, such as learning strategies, learning methods, and approaches, as well as learning resources used in the form of books, modules, worksheets, and learning media.

The use of media in genetics learning can help lecturers' limitations in conveying information about class time. Media serves as a source of information on learning materials and a source of practice questions. Learning media can be created and designed by the development of science and technology. Technology and information-based learning media (ICT) are used to make learning in Genetics more interesting and have a positive impact on academic performance, such as learning motivation and student learning outcomes (Chuang, 2014). The use of ICT-based learning media can make genetics learning more effective. The use of ICT-based learning media can facilitate the implementation of learning as written in PP No. 32 of 2013 article 19 paragraph (1) which states that learning activities in educational units are held interactively, inspiring, fun, challenging, and motivating students. One of the ICT-based learning media that can be used as a learning medium that is operated on a smartphone device is mobile learning (m-learning).

The most popular and widely used operation. The use of Android-based learning media is one of the 21st-century learning media (Calimag et al., 2014). The use of Android-based learning media plays a role in helping to improve learning outcomes in the cognitive domain (Chuang & Chen, 2007; Jabbour, 2014) and student learning motivation (Hess, 2014; Calimag et al., 2014). Implementation of learning using smartphones and tablets can improve cognitive, metacognitive, affective, and socio-cultural learning outcomes. Smartphones and tablets can transform the learning experience. Defense Media Teachings like this allow students to learn not limited to time and space with interesting applications (Squire, 2009; Meister, 2011).

The development of the Android operating system and other applications can support students using Android in learning. Learning using smartphones can have a very positive impact on the learning process and provide a lot of convenience in its use. Android-based learning is learning that uses Android as a learning medium. Android is an operating system for Linux-based mobile devices that includes an operating system, middleware, and applications. Utilization of android smartphones as learning media in Genetics courses using software to create applications.

Discussion

Lecturers as teachers must be able to increase student interest in learning. Lecturers must master all the skills needed in the learning process, including mastering the material and being able to create interesting and varied learning media. If the lecturer does not use variations in the learning process, students will quickly get bored with the subject matter. Several factors can increase student interest in learning, namely (1). Lecturers must use variations in teaching so that the enthusiasm and interest of students in learning increase so that learning achievement is as expected. (2). Lecturers help students connect the material they are expected to learn with themselves as individuals (Sofan & Elisah, Tatik, 2011). (3) Lecturers must involve students in teaching and learning activities in class, especially in achieving assignments in front of the class. (4). Lecturers must use learning media so that students can quickly accept lecturers' explanations, increase interest in learning and make it easier for students to understand the subject matter.

Education and learning will develop along with the changes and developments of the times. In the 21st century, technology and information affect every aspect of human life transforming from an industrial society to a knowledge society (Sulaiman and Shahrill, 2015).

This transformation is known as the era of the industrial revolution 4.0 which touches all aspects of human life, such as trade, industry, agriculture, banking, and education. In the era of the industrial revolution 4.0, the education system makes more use of technology-based visualization which is used as a tool in learning that is more effective, efficient, interactive, and attractive (Zhong et al. 2017; Witkowski, 2017; Thoben et al. 2017). Therefore, lecturers must be able to improve their understanding of expressing themselves in the field of media literacy and understanding the information that will be shared with students (Meliantina, 2018). In improving skills, lecturers can arrange more interesting learning materials by adding technology to learning and creating digital learning media (Yuniani et al., 2019). Digital learning media created by lecturers must be adapted to the needs and characteristics of students.

Digital learning media are learning media that use digital technology to carry messages (information) that can be used for learning purposes (Chiem, 2012). Digital learning media presents various innovations that aim to facilitate, streamline and streamline the learning process (Cristensen et al. 2018). Various forms of digital learning media continue to develop, such as interactive multimedia, digital video, animation, podcasts, augmented reality, virtual reality, game-based learning, gamification, mobile learning, and learning media based on Android mobile smartphones.

The use of ICT in education continues to grow. ICT can be grouped into an e-learning system (electronic learning), namely as a learning model that utilizes electronic devices, digital media, and mobile learning as a form of learning that utilizes mobile devices and communication technology. ICT creates many breakthroughs in the learning process, namely mobile-based learning (device by cell phone).

M-learning is a learning model that uses mobile technology and mobile devices that are used as a learning medium. M-learning was developed with a multimedia format that provides text, images, and audio and minimizes video and animation due to the limited content size so that it is easily accessible via cellphone so that it becomes interesting and easy to understand learning material. M-learning is an alternative learning model that can be accessed anytime and anywhere. The development of m-learning in the future is very wide open considering the tendency of an increasingly dynamic and mobile society as well as the demands for quality and diverse educational needs. The learning concept is expected to encourage the realization of an effective and innovative learning atmosphere so that it can motivate the learning spirit of students and lecturers.

The development of mobile technology is very fast, both in terms of networks and equipment (devices), which has caused this technology to accelerate at an amazing speed. It's no wonder that current HP users are very easy to find, even in remote areas rural and inland. The rapid development of mobile technology occurs in connectivity such as Wi-Fi, third generation (3g) mobile communications, as well as Worldwide Interoperability for Microwave Access (WiMAX), and devices such as smartphones, pocket PCs, tablet PCs, and various variations. Personal Data Assistants (PDAs).

Various driving factors in the development and application of mobile learning as a new model in learning activities, including the very high penetration rate of mobile devices, the level of use that is relatively easy, easy to accept, and the prices of devices that are increasingly affordable compared to personal computers (PCs). The tariffs are getting cheaper and the features are growing and sophisticated, the range of wireless or cellular services is getting wider. In addition, m-learning can form a flexible learning paradigm that can be done anywhere and anytime.

Mobile devices have great potential as learning media because the percentage of cellular phone users in Indonesia continues to increase. Part of the amount Cell phone users

are students, lecturers, and academics. Cell phones owned by students and lecturers generally have very sophisticated features and can run content in the form of multimedia and software applications.

The existence of easy internet access through cellular phone devices such as blackberries, iPhones, PDAs, and smartphones makes it easier to make learning applications. The above matters are taken into consideration in the development of m-learning. The reality is that there are currently very few efforts to develop mobile device-based learning content that can be widely accessed. Most of the content in the field is still dominated by entertainment content, social media, and very little educational content. Therefore, it is necessary to develop mobile learning-based content/applications that are more varied, inexpensive, teachable, and easily accessible.

The development of m-learning content/application must be able to increase students' motivation and learning outcomes to learn. Various attempts have been made to develop m-learning as an effective and innovative learning medium. According to Clark Quinn, m-learning is defined as…The intersection of mobile computing and e-learning: accessible resources wherever you are, strong search capabilities, rich interaction, powerful support for effective learning, and performance-based assessment. Learning independently of location in time or space (Wijaya, 2006).

M-learning provides learning materials that can be accessed by students at any time and are presented with an interesting visualization of material. M-learning is a learning model that involves mobile devices so that students can access learning materials, learning instructions, and learning applications without being limited by space and time, wherever and whenever they are. M-learning is defined as e-learning through mobile computing devices.

M-learning is delivering defense material electronic learning through mobile computing so that students can access it from anywhere and anytime. M-learning as a device can work alone can be carried at all times in everyday life, and can be used for several forms of learning. Smartphones can be used as a means of accessing content, either stored locally on the device or accessible via interconnection. This device can also be a tool for interacting with other people, either through voice or exchanging written messages, still images, and moving images. The characteristics of mobile learning are: 1) it is part of e-learning, which utilizes electronic and digital ICT; 2) can be accessed anywhere and anytime; 3) provide facilities for knowledge sharing and visualization of knowledge that are attractive and interactive; and 4) not all learning materials are suitable for using m-learning given the limited file size (Boyle, 1987).

The development of m-learning, especially HP, is very likely to be optimized for use for learning because it offers many opportunities, such as the following: a.) Portability, with a very portable physical size, current devices have excellent capabilities in terms of multimedia internet access, software access commercial, as well as other capabilities that are very conducive to learning activities. b.) Save space, small in size and light in weight, mobile phones and computers do not require a special place and are easy to move from one room to another, especially because they do not require cable connectivity. c.) Connectivity, with the ability and ease of instant access to internet sources, email, and virtual forums, this mobile device will be able to facilitate the learning activities of students, students, teachers, lecturers, instructors, facilitators, and so on. d.) Complete functionality, modern handheld devices now have features and functional capabilities that are closer to the functions of desktop computers, internet access, and multimedia capabilities. These two abilities have the most potential to support an interactive and innovative learning process. e.) Instant, HP generally operates instantly, so it does not require booting time like a laptop or desktop computer. f.) Long battery life, with this advantage, the cellphone can be used without having to be disturbed by

the connection power cord, so that it can be used both indoors and outdoors or wherever students study. g.) Ability to record and process information. h.) Ability to manipulate, interpret, and share texts so that files and information can be transferred from students to teachers or vice versa quickly. This ability also facilitates team building and collaboration in the learning process. i.) Inclusive, with HP students who experience psychological and physical problems, can participate in learning, directly or indirectly. j.) Group/teamwork, HP allows students to interact with one another more effectively.

The development of m-learning, especially HP, is very likely to be optimized for use for learning because it offers many opportunities, such as the following: a.) Portability, with a very portable physical size, current devices have excellent capabilities in terms of multimedia internet access, software access commercial, as well as other capabilities that are very conducive to learning activities. b.) Save space, small in size and light in weight, mobile phones and computers do not require a special place and are easy to move from one room to another, especially because they do not require cable connectivity. c.) Connectivity, with the ability and ease of instant access to internet sources, email, and virtual forums, this mobile device will be able to facilitate the learning activities of students, students, teachers, lecturers, instructors, facilitators, and so on. d.) Complete functionality, modern handheld devices now have features and functional capabilities that are closer to the functions of desktop computers, internet access, and multimedia capabilities. These two abilities have the most potential to support an interactive and innovative learning process. e.) Instant, HP generally operates instantly, so it does not require boot time like a laptop or desktop computer. f.) Long battery life, with this advantage, the cellphone can be used without having to be disturbed by the connection power cord, so that it can be used both indoors and outdoors or wherever students study. g.) Ability to record and process information. h.) Ability to manipulate, interpret, and share texts so that files and information can be transferred from students to teachers or vice versa quickly. This ability also facilitates team building and collaboration in the learning process. i.) Inclusive, with HP students who experience psychological and physical problems, can participate in learning, directly or indirectly. j.) Group/teamwork, HP allows students to interact with one another more effectively.

M-learning is able to present images with various image qualities ranging from monochrome types to high-quality color images. Image files that are supported by the device are generally of type PNG, GIF, and JPG. Giving pictures in the learning content to complete and clarify the description of the text. In addition, mobile learning is able to present audio formatted content, such as rm, mp3, amr, and others. Audio files usually have a fairly large size, so they need to be processed first so that they can be used in an m-learning environment where the memory capacity is relatively small. Some types of m-learning can present video and animation files, although in limited quality and size. The file formats supported by m-learning include 3gp, MPEG, MP4, and others. Most video files have a size large enough that they must be converted and adapted to the limitations of m-learning. The development of m-learning content can be done based on the platform, design user interface (user interface design), development process (development process), components, system development components (technical resources/system requirements), and distribution format (distribution format).

There are several platforms that can be used for the development of m-learning programs, including Flash Lite, Java, Symbian, Windows Mobile, and WAP Applications. For example, the Multimedia Development Center (BPM) Semarang, has developed and is currently developing mobile learning using the flash lite platform. Flash Lite This platform was developed using Adobe Flash. Flash lite player is a lightweight version of flash player. Flash Lite itself is based on Flash 4 scripting engine technology which is specifically aimed at

mobile applications. Building a mobile application in a flash lite environment does not require a lot of program code, but developers can use a graphics-based Integrated Development Environment, namely the Macromedia Flash Professional application.

The scripting language used in Flash Lite is an Action Script, just like Flash, but has feature limitations. This platform can be run on HP that supports flash lite. This platform is usually used by HP for wallpaper or screen server applications in the form of animation. At this time there are many cellphones that support flash lite. In its use, flash files can be run directly without the installation process. In the learning process, the user opens this mobile learning using a flash lite player. This flash file is data that can be run by a flash lite player. Data files from m-learning can be distributed using the web, wap, Bluetooth, infrared, flash, CD, and other storage media. In other words, on this platform users can learn offline. Learning using m-learning must meet the standard of the learning process, which is interactive, inspiring, fun, challenging, and motivating students to learn. M-learning can increase the effectiveness of learning and learning knows no age and knows no boundaries. Learning can be done anywhere and anytime without being limited by space and time. Accessible learning materials online using HP. M-learning is a learning model that is carried out between places and environments using technology that is easy to carry when students are in mobile conditions. With the various potentials and advantage it has, m-learning can be an alternative learning resource that can increase the efficiency and effectiveness of student learning processes and outcomes.

M-learning can help students to study anywhere and anytime as needed. M-learning is part of e-learning, learning using internet technology which is widely used in various schools. This learning model is a form of innovation in helping the learning process. This is an opportunity to use mobile phones for learning, at home, and in the classroom. Learning with m-learning will be more effective when combined with other learning so that m-learning is used as a supplement in learning. For example, in learning media based on android mobile smartphones.

Learning media based on android mobile smartphones utilize mobile devices in learning (Wijaya et al., 2019). Android is a smartphone operating system based on the Linux 2.6 kernel which includes operating systems, middleware, and applications (Kirthika et al. 2018). Android growth in Indonesia reached 89%, this is because the Android operating system allows users to get various applications and have various benefits (Paridawati, 2021). Learning media based on an android mobile smartphone is a new paradigm in the learning process and solving problems in learning.

Learning media based on Android mobile smartphones can help students master lecture materials in the Genetics course. Especially for students who lack motivation in reading lecture books, modules, dictates, handouts, student worksheets, and others. Android mobile smartphone is an alternative learning supplement that can provide opportunities for students to learn independently. Through learning media based on android mobile smartphones, students can access lecture materials easily, as easily as accessing other social media. The development of learning media based on android mobile smartphones as a supplement to the Genetics course has been successfully developed by producing 3 applications. The three applications contain difficult materials in the Genetics course. The results of the development show that student's motivation and learning outcomes increase with the use of learning media based on android mobile smartphones. Learning media based on android mobile smartphones is produced as a positive impact and breakthrough from ICT advances. The use of ICT in education is very important in order to improve the quality of education.

Conclusion

The development of technology that is increasingly developing is a means to develop media learning. Learning media is anything that can be used to channel the sender's message to the recipient so that it can stimulate the thoughts, feelings, concerns, and interests of students to learn. Lecturers are required to provide motivation and have skills in the use of learning media in the classroom and outside the classroom. There are several negative impacts if there is no learning media, namely 1) lecturers find it difficult to teach and students feel bored during the learning process. 2) students find it difficult to understand the concepts of learning materials. Therefore, learning media is needed for effectiveness and to increase student interest in learning.

Learning media makes it easier for lecturers to carry out learning and creates conditions that can encourage students to achieve their competencies in the learning provided by the lecturer. One of the ICT-based learning media that can be used as a learning medium that is operated on a smartphone device is mobile learning (m-learning). M-learning was developed with a multimedia format that provides text, images, audio, and video. The ease of internet access through cellular phone devices such as blackberries, iPhones, PDAs, and smartphones makes it easier to make learning applications using an Android-based system. The development of learning media based on android mobile smartphones as a supplement to the Genetics course has been successfully developed by producing 3 applications. The results of the development show that students' motivation and learning outcomes increase with the use of learning media based on android mobile smartphones. Learning media based on android mobile smartphones is produced as a positive impact and breakthrough from ICT advances to improve the quality of education.

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