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Mobile Learning: Learning Tools in the Era of Industrial Revolution 4.0

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Abstract

The application and adaptation of technology in the learning space is very important to keep up with the changing times of globalization. The development of information and communication technology has had an impact on the world of education, especially the learning process. The purpose of this research is to find literature on mobile learning and its applications as well as the tools used in the learning process for educators and learners in the 21st century. The research findings from the literature show that the use of mobile technology affects the development of mobile learning applications as a tool in the learning process in the 21st century. Mobile learning applications can be used by educators and learners as long as they are connected to the internet. The development of mobile applications makes educators must master its use. Learners can also use the application to store their knowledge about the required teaching materials. The conclusion from this research is that "mobile learning brings changes in the way educators and learners think and work, their mastery of existing technology, and their ability to adapt and survive in the external environment.

Keywords*: 21st century, mobile learning, technology*

Abstrak

Penerapan dan adaptasi teknologi dalam ruang belajar sangat penting untuk mengimbangi perubahan zaman globalisasi. Perkembangan teknologi informasi dan komunikasi telah memberikan dampak pada dunia pendidikan, khususnya proses pembelajaran. Tujuan dari penelitian ini adalah untuk menemukan literatur mengenai mobile learning dan aplikasinya serta perangkat yang digunakan dalam proses pembelajaran bagi pendidik dan peserta didik di abad 21. Jenis penelitian yang digunakan adalah tinjauan literatur. Temuan penelitian dari literatur menunjukkan bahwa penggunaan teknologi mobile mempengaruhi perkembangan aplikasi mobile learning sebagai alat bantu dalam proses pembelajaran di abad ke-21. Aplikasi mobile learning dapat digunakan oleh pendidik dan peserta didik selama terhubung dengan internet. Perkembangan aplikasi mobile membuat para pendidik harus menguasai penggunaannya. Peserta didik juga dapat menggunakan aplikasi tersebut untuk menyimpan pengetahuan mereka tentang bahan ajar yang dibutuhkan. Kesimpulan yang diperoleh dari penelitian ini adalah bahwa "pembelajaran dengan mobile learning membawa perubahan terkait cara berpikir dan bekerja pendidik dan peserta didik,

penguasaan teknologi yang ada, serta kemampuan mereka untuk beradaptasi dan bertahan di lingkungan eksternal.

Kata Kunci: abad 21, mobile learning, teknologi

Introduction

The development of technology in this era is advancing very rapidly along with the advancement of science and the use of technology. Technology penetrates various fields, including the field of education (Dakhi et al., 2020; Bano et al., 2018). Those involved in the world of education must be able to keep pace and follow these technological advances. Not only teachers/lecturers who are technology literate, but students or students must also be able to keep up with technological developments. Facing the era of the industrial revolution 4.0, characterized by a combination of automation and cyber technology. The 4.0 revolution instils smart technology that can connect with various areas of human life, including the world of education (Crompton & Burke, 2018; Dakhi et al., 2022).

Mobile learning is considered a new stage in computer and distance learning development. The definition of mobile learning as e-learning using mobile phone devices and wireless transmission considers mobile learning the fourth generation of the electronic learning environment (Martha, Adi & Soepriyanto, 2018; Masril et al., 2021). Mobile devices have given people the freedom to use them whenever they need, wherever and whenever they need to. Wherever the learners are, the learning process still occurs; it can happen anytime and anywhere, with the services offered by mobile devices that present learning content and enable wireless communication between lecturers and students (Masril et al., 2022; Zagoto, 2022). In addition, mobile devices also provide opportunities for learners (students) and educators (teachers/lecturers) to utilize their free time while travelling for assignments or lesson preparation.

The ease of accessing learning content in mobile learning provides options for self-study and can be used as an evaluation and feedback tool. Mobile learning also facilitates interaction between students and lecturers in class and enables information exchange outside the university. Mobile learning is an e-learning process carried out by someone (educator or learner or anyone) that can occur whenever they want to learn a theme/topic they want to learn on condition that they must be connected to the internet and supporting mobile devices they have (Bano et al., 2018). Based on this theory, mobile learning is one of the technology-based learning models, especially mobile devices and internet networks with good signals, so that users can immediately obtain the information sought. The advantages of mobile learning are lifelong learning, learning when needed, self-learning, and learning depending on conditions, known as distance learning. Mobile learning has helped many types of learning (Muyaroah, 2017). Mobile learning impacts students to learn individually and online, so it becomes easy to update and self-assessment as feedback; these are considered advantages of mobile learning. Thanks to the development of mobile technology, it is possible to support student and teacher activities.

Theoretical Foundation

The industrial revolution has changed the way people live, as well as the learning process. The fourth industrial revolution combines several technologies and three scientific fields: Physical, digital and biological sciences. According to experts, the positive impact of the fourth industrial revolution is that a country's per capita income will increase, improve quality and extend human life (Aripin, 2018; Hamidi &

Chavoshi, 2018; Zagoto & Dakhi, 2018). The increasing number of smartphone sellers and relatively low prices have made it easier for consumers to obtain mobile devices with various income levels. It will increase consumer satisfaction by enjoying the convenience of mobile technology in human life for communication and data transfer.

The impact of technological developments during the industrial revolution 4.0 in the 21st century has changed the style of the learning process for everyone (especially teachers/lecturers, students or anyone) so that the challenges of this era must be addressed properly and wisely by both parties in particular so that can achieve learning objectives.

In the 21st century or millennium, information transformation is so fast without being influenced by space and time because it is accompanied by technological developments that are always racing against time, as well as information about teaching materials/learning materials in the form of text, video, images (multimedia). The characteristics of the 21st century, namely: (1) up-to-date information, meaning that information is not limited by space and time; (2) fast computing/calculation; (3) routine daily work can be replaced; and (4) communication that can be done without being limited by space and time (Zagoto, Yarni & Dakhi, 2019; Zhang, Patras & Haddadi, 2019).

The level of success of learners in navigating life and also their work in the 21st century than anyone who wants to learn must, based on the learning framework of the Partnership for 21st Century Learning can, keep up with developments and master technological changes at any time; 2) able to understand the information circulating well through existing media; 3) can innovate, create so that they have certain skills; 4) have a good career by the skills or expertise possessed. The same thing was also conveyed by Kemdikbud, where students are required to have the ability to define problems, then problem-solving, critical thinking, learn from various sources anytime and anywhere, can work in teams and collaborate.

Utilization of various kinds of e-learning application technology on the internet, both synchronous and asynchronous systems, for example, LMS (learning management system), is an excellent tool in the learning process in the 21st century by educators and students so that information builds one's knowledge up to date, and to master the five core competencies in the 21st-century learning can also use mobile learning as learning multimedia.

a. Ways of thinking

The 21st century way of thinking is metacognition skills: for learning to learn and maximizing their learning, they have responsibilities of their knowledge. To improve this skill, teachers need to teach students how to reflect on each learning progress so that students can think critically and solutively. For each task given, children have the right to get feedback on their results. Children can reflect on their learning progress and get ideas for improvement.

b. Ways of working

In this aspect, 21st-century education aims to improve students' abilities in communication and collaboration. Communication includes oral and written language competencies. Sensitivity is equally important to develop so that children can be more open-minded in understanding their interlocutors. Collaboration becomes more important than competition. Therefore, teachers are encouraged to increase collaborative activities such as discussions and creating work or group presentations. These activities can improve children's Ability to work in a team and maximize their potential according to their respective roles.

c. Ability to master technology (Tools of learning)

Schools and teachers can utilize existing tools to maximize the learning process, for example, to experiment with digital media, create creative artworks with existing software, conduct projects by using social media, and present and share ideas and discoveries through websites (Crompton & Burke, 2018). Most importantly, teachers must explain to students the responsibility of using technology (internet/gadgets) and warn them about the dangers of cybercrime and pornography. The internet also greatly benefits teachers in accessing ideas related to learning strategies and lesson plan materials. Therefore, in 21st-century learning, printed books are no longer the main source for teachers because access to teaching materials and ideas is widely spread online. Foreign language mastery becomes important to expand teachers' reach in learning.

d. Having the Ability to Survive Anywhere (How to live in the global world)

21st-century education must guide children to be ready to live and develop in the worldwide world. Children need to understand that they have a role in protecting the surrounding environment and an obligation to participate in the community as citizens and even global citizens. Teachers must guide children to get used to constructive communication with others and flexibility in seeing the different perspectives they encounter (Bikanga-Ada, Stansfield, & Baxter, 2017). Not only that, but this skill also includes the ability to plan life and career. As a solution, teachers need to encourage children to self-regulate and facilitate them with information about jobs and how to recognize their interests and talents.

Method

The research conducted is a type of literature study research, where data is taken from books or journals relevant to the research theme raised as a fundamental and main tool for research practice so that it can run properly. The technique of concluding this research is by looking for textbook references or journals related to the research title.

Result And Discussion

Every content/media in mobile learning can be a document (text or graphic), audio/sound, video, movie or picture. Every student connected to their car can access the content/media (Bano et al., 2018). When creating media/content, some things that can concern programmers are the achievement of SKKD or learning outcomes through the media or multimedia created.

Other things must be considered when using mobile learning: Content, Lecture, Custom, Learning Components, and Context. The principle of mobile learning, Four C's: Channels to facilitate Access to contents/media, Infrastructure, and Application. Evaluation in mobile learning can be made in the form of Personal reflection/text, Quiz, Branching Scenario, Simulation-driven Interaction, Contex, and Capture, in the form of sound, image, video or text (Lim et al., 2020).

The implementation of the learning process using mobile learning has several advantages for both educators and learners, namely:

a. The number of learners can be large, just like a class in the real world, but now the class is located in many locations but towards one educator and one subject/course.
b. The price of mobile devices (smartphone, laptop, iPad) varies, but all levels of society can purchase these devices.
c. Access to learning materials can be done unlimited by time and space.
d. The size of mobile devices is small compared to PCs, so it is easy to carry by the owner anywhere.

E-learning that still uses PC devices makes e-learning users (educators and

learners) remain limited to space and time in the learning process; with the discovery of mobile technology, the problem of limited space and time is answered; thus, if educators or learners use mobile learning, by the advantages of mobile learning above, it will result in time and cost efficiency, and will achieve the achievement of learning objectives more quickly (Astuti, Sumarni & Saraswati, 2017).

The disadvantages of using mobile devices are not so significant anymore at this time, for example about data storage capacity, there are already many external memories that are compatible with the mobile device used by the user; the battery life problem is answered by using a power bank that can use longer; about the display on the mobile screen, along with technological developments, the average existing application is responsive (complete information on one user screen) with the screen used by each user, so the user no longer needs to zoom out/in or slide the screen to the right or left, up and down so that all information is obtained.

The ability of smartphones today can know the surrounding conditions either now or predictions for the next few days: such as the degree of temperature in an area, weather conditions, light intensity levels, air pressure levels, and magnetic fields and can increase the ease of communicating with Bluetooth and detecting Wi-Fi signals (Amirullah & Hardinata, 2017).

The mobile learning model makes it easier for users to control when and where they study in terms of accessing materials. The flexibility offered by mobile learning gives users the freedom to improve their quality of life. Also, educators can innovate in making the subject matter delivered more interactive and creative.

The learning process that utilizes mobile learning (android-based smartphones), which is presented with interactive and fun multimedia for users, will have an impact on improving student learning outcomes, especially students understand the core content / subject matter, especially material that is difficult to understand, as stated that learning will be fun, interactive and interesting by using mobile learning with an android-based operating system (SO) or others, and also make students have the ability to master technology according to their development and accelerate the process of achieving the objectives of a theme studied.

The number of mobile devices is more than PCs because these devices are lightweight and easy to obtain internet network access in the form of data packages and WiFi that are available and also faster to learn so that users of these mobile devices have easy access to updated information wherever and whenever needed.

More and more programmers produce various kinds of mobile learning applications, both synchronous and asynchronous systems in use; this results in the goal of education for lifelong learning (long life education) can be applied well for everyone. It is easy for educators to update learning materials on mobile learning applications that will be given to students anytime and anywhere, according to the educator's wishes. Still, it cannot be separated from the competency standards, basic competencies, or learning outcomes for each subject.

However, the utilization of this mobile device is still widely used by its owner limited: receiving calls, SMS, social media, playing games and watching movies, so it needs continuous socialization to smartphone users in particular so that they can take advantage of this telecommunications facility to learn independently by utilizing existing mobile learning applications so that in the future the positive impact of mobile technology development is more prominent than its negative impact. In addition, it is necessary to increase the development of material or content contained in mobile learning applications by the culture of Indonesian society programmers, with more attractive presentations such as animations used are

more varied, equipped with video tutorials, not just text and also more user friendly, which are equipped with online application usage guides (in videos), relatively low costs and users are easy to access in their spare time so that with the many mobile learning applications made by Indonesian children will have a positive impact in building the knowledge of Indonesian people and the noble values of the nation are well preserved.

If the mobile learning application is still dominated from abroad, sometimes there are cultural values that are not suitable for Indonesian people, such as entertainment content that is not suitable for the eastern customs of Indonesian society. The research results on mobile learning applications are minimal, especially in pedagogical aspects, social impact, psychological aspects, and other aspects (Rahmat et al., 2019). Many of the existing studies are on how to use mobile learning software. Suppose further research is conducted on some of the above elements. In that case, it will certainly result in the need to design a mobile learning application that can answer the problems from the results of this research later so that when mobile learning is fully implemented, online learning can truly achieve the learning objectives that the government has regulated.

The mobile learning application designed by the programmer (Samala, Fari & ranuharja, 2019) must have the following characteristics: 1) Utilizing information technology devices so that two-way communication occurs online (user's); 2) Using computer networks and various other digital media; 3) Teaching materials used are installed on mobile devices (self-learning materials), anytime and anywhere can be easily accessed by users when they need; 4) Complete administration that can be viewed online by educators and learners on their mobile devices, consisting of the development of the percentage of learning completeness of each learner for each subject matter; lesson schedules, collection of assignments/exercises/self-test, assessment results (evaluation) from educators to learners; attendance lists; and announcements or track records of chats conducted.

Facilities and infrastructure in the mobile learning process (Shen, Kuo & Minh, 2017), namely: 1) availability of internet network facilities; 2) type of network that can use: Local Area Network (LAN) or World Area Network (WAN); 3) Users have a mobile device, such as smartphone, laptop or iPad with the availability of internet package or WiFi; 4) There is a service (help) to mobile learning application users if users experience difficulties in using the mobile learning application they use.

Conclusion

Mobile learning application is one of the tools in the implementation of 21st-century learning, as the challenges of the 21st century are expected that students can have communication and collaboration skills in solving a problem in achieving certain goals. Educators are also required to be able to accompany technological developments and use technology in conducting learning without being limited by time and space constraints. However, continuous socialization needs from all parties, especially educational institutions, to increase the use of mobile devices (smartphones/laptops/phones) in the learning process. Hence, it is not limited to general use (such as calling/receiving calls, SMS, social media networks, playing games and watching movies). There needs to be further research on existing studies' results, especially on pedagogical aspects, social impact, psychological elements, and other aspects.

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