# HASIL CEK_3. The Mobile Learning Implementation

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# The Mobile Learning Implementation for Physics Lesson in Indonesia: A Narrative Review



# The Mobile Learning Implementation for Physics Lesson in Indonesia: A Narrative Review

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**Abstract.** Indonesia is an archipelago with a vast landscape. Equal access to education has been an important issue in improving the quality of education to support human resource provision. This study is a narrative review study based on reflections during conducting multi-year research from 2015 to 2020 funded by MOEC. During the research period, authors arranged socialization, training, mentoring, and measuring the impact of mobile learning implementation in rural and remote areas, especially in eastern Indonesia. The results of this study indicate that there is good potential for mobile learning to support equitable access to education. Governments need to consider several essential aspects so mobile learning can work well. The aspects are the readiness of infrastructure and the readiness of technology acceptance by educational decision-makers and principals. The results of this study, as a whole, can be used as a basis for developing various educational policies in the disadvantaged region.

## 1. Introduction

The concept of 21st-century learning declared by the Education Commission of UNESCO encourages sustainable education that develops more essential competencies and skills in human's life. From time to time, competency shifting always occurs to survive in the nowadays era. The five core skills in this era are skills of complex problem solving, critical thinking, creativity, people management, and coordinating with others. Many factors are affecting this shifting. One of them is the rapid and swift development information and communication technology. Policy-makers need to anticipate this change in education through a variety of policies and also on learning implementation at schools.

The concept of 21st-century learning has been adopted by many countries in the world to implement the learning revolution in order to create a better generation. This concept encourages a learning environment where students master learning materials while producing, synthesizing, and evaluating information from various resources with the awareness of respecting a variety of cultures. In this kind of learning environment, learners do not only master 3R (reading, writing, arithmetic), but also 3C (creativity, communication, collaboration). The high digital literacy of learners at this time in using a variety of software and virtual devices gives them unlimited learning ranges in terms of spaces, time and with whom they learn [1]-[3]. Until now, educators has not relatively respond this opportunity to optimally in the field of education in Indonesia yet.

Optimism related to learning in the digital era is very high in urban schools. In some national policies at this time, the government also initiates several applications and related policies. However, at suburban schools, a variety of problems need concerns to give equal learning access to learners. The penetration level of Information and Communication Technology (ICT) in Indonesia with relatively equal distribution in each region becomes a unique opportunity for the implementation of 21st-century learning. With technology development nowadays, the question is, can technology support the achievement as a useful human being in the communities? The technology utilization unreadiness of the communities, particularly in the field of education will be a nightmare for learners to survive as community members.

The development of technology and science affects new opportunities in learning strategies and methods, including learning at high schools [4]. Educators realize that the constructivist paradigm can give learners more opportunities to better master knowledge from a variety of perspectives. Most researchers studied the student-centered learning approaches to improve the learning quality [5]-[7]. Therefore, learning becomes an activity that is managed and directed independently by learners [8] to achieve the learning goals. Users develope a variety of learning models by utilizing various learning resources to give a pleasant learning environment [9]-[12]. It includes an opportunity to utilize mobile technology that gets cheaper.

Fortunately, young people dominate internet and mobile gadget users' penetration, so mobile devices for learning become possible. The result of research related to cooperative learning strategies has become the basis for the learning development and implementation by using mobile devices. Researchers have tested these learning strategies at schools and on e-learning implementation It could be an alternative for improving learning performances.

## 2. Method

This study is a narrative review in the context of mobile learning. The assessment approach in this study is phenomenological. The author is an investigator in this research. The narrative is summed up a reflection from the author while researching the application of mobile learning in Indonesia. It focuses on rural and remote areas in eastern Indonesia. The research carried out is a multi-year study from 2015 to 2020 funded by the Indonesian Ministry of Education and Culture. This study is as a reflection of mobile learning's application for equal access to education in Indonesia based on various achievements of socialization, training, mentoring, and measurement of mobile learning application in the schools.

## 3. Result and Discussion

### 3.1 The trend of Mobile Learning Implementation

Mobile devices are generally small, portable, and complete [13]-[15]. These devices are more comfortable to carry on pockets or handbags. However, since the screen is small, the question is: are these devices beneficial for e-learning? With the development of mobile device technology that provides larger screens, the utilization opportunities also develop [16]. In the new developments, these devices have quickly accommodated user needs including in learning. It could send information quickly and in a considerable number; things those previous devices probably do not have; including the presence of technology Internet of Things [4],[16],[17].

The change in the ICT utilization that is mobile and wireless in learning develops widely and rapidly in various aspects [13]. The research results have recommended using these devices as learning ai such as tablet PCs, iPods, Personal Digital Assistants, and smartphones [18]. Nowadays, people get more comfortable using mobile devices in learning activities [19].

The invention of the internet and related technology that connects information from various places in a short time has changed many things in human life. One's attitudes and behaviors also change. People born in the era before the invention of the internet or digital technology (digital immigrants) and those born after that era (digital natives) have different characteristics in several aspects [20]. If this matter occurs to educators, these will also influence how they view technology for education.

Digital natives tend to feel comfortable with digital activities in cyberspace or virtual world. They tend to quickly self-adapt and learn in a digital environment that also changes quickly. On the contrary, digital immigrants tend to feel comfortable with activities in real space (not cyberspace), They also relatively be quite technologically backward when facing information technology changes. It is a fundamental distinction between the two generations.

At that time, in the 2015 era, educators still consist of the two generations. The educator's attitudes towards the technology of the internet, online activities, and the virtual world will determine on how teacher deliver education to learners. Surely, learners are digital natives. At some schools led by a digital immigrant, sometimes learners could not use the information technology in the learning process. It is probably only a sample of an extreme case. When learners feel comfortable with the digital and virtual world, but principals prohibit for particular reasons, it will create inconvenience in learning. Learning becomes not fun. This psychological aspect of learners needs concerns on how to develop learning alternatives that are appropriate for the nowadays learner characteristics.

The range of digital technology development is relatively long, and the acceleration of development that gets higher cause rapid change. The learner's attitudes are also different from time to time in facing this technology. Schools need to anticipate this situation in managing education. It needs to adjust the learning management and environment of the developing technology.

### 3.2 Technology Readiness to use mobile learning

Indonesian societies in the 2010s have been ready to utilize mobile technology, both socially and technologically [21]. However, there is a paradox that schools do not facilitate learners that have functional ICT literacy for learning at schools [21]. In other words, the use of smartphones as mobile learning devices at schools is controversial. On one side, schools prohibit the use of smartphones since they will disrupt the classroom's learning process. On the other hand, educators consider a lot of potential benefits from mobile technology.

The positive thing is the public awareness on utilizing ICT in learning. Particularly mobile learning has changed significantly [22]-[24]. This phenomenon is a part of the implication of wireless and mobile technology, which has developed rapidly in recent years. This technology becomes cheaper with higher capacity and smaller size. This technology encourages educators to realize that digital technology provides opportunities of a different learning form. It includes in the relationship between educator and learners, educator and educator, learner and learner, and learner with teaching materials or competencies [25]-[27].

Surveys on Global Digital Statistics show the utilization of ICT in learning in Indonesia in a variety of activities [28]. There are a variety of developmental opportunities to support the implementation of mobile learning at schools. These include the more extended time people spend to access internet on mobile devices, the higher intensity of social media use for interaction among people, and a better technology distribution among regions. School need to consider the increasing trend of mobile devices used as opportunities for learning on how activities learners do with mobile technology. This technology could support them to achieve optimal competencies.

### 3.3 Technology Integration in Learning

Technology integration in learning can increase learning experiences. It create a new learning environment using mobile technology [29]. M-learning gives opportunities for learners to remain involved in their learning environment that, at this time, cannot be given by static technological devices such as a desktop computer. The change in teaching and learning philosophy has shifted from teacher-centered learning to student-centered learning [12],[30].

Mobile technology gives more possibilities to improve the teaching quality in many aspects [31],[32]. Learning to actively build knowledge rather than passively respond to a tutorial act is essential in the new approaches. The constructivism learning approach encourages many skills. These are thinking explicit learning, reasoning, encourages problem-solving and effective skill planning, learning for learning from mistakes, developing reflective meta-cognitive skills [33]-[35]. The common understanding of constructivism is by actively trying to create a real thing either in the forms of physic or computation to solve problems. So far education system tends to follow the pattern of one

approach but made to be suitable for all characteristics of learners in learning. Besides, in traditional learning, learning tends to be identical with activities. Learners are all in the classroom even though they have different interests and attitudes towards particular materials or subject topics. The low flexibility in learning will influence the learning performances related to motivation.

The development of technology at this time, the latest research results related to learning motivation, and an appreciation of learning desires and attitudes influence the education. These factors becomes better if facilitated with a variety of learning media and learning resources that are plentiful, easy and diverse [19],[36]-[38]. The condition of the learning environment change encourages the occurrence of a more personal learning approach or well-known as the personalized learning environment. It is possible for the individual to self-determine and design learning needs. It is in terms of learning methods, target, resources, partners, materials, and other elements to build learning interaction. They are freer and motivating [39],[40].

It means new opportunities in developing a learning environment that is more possibility to give appreciation to the individual in learning with the support of ICT that develops rapidly now [41]-[43]. Now, a school is not the most dominant learning place. Today's learners study anything from a variety of resources. They could learn at home, societies, and from anywhere with substantially different methods to those in the past. There are prominent tendencies in the learning environment that influence nowadays learning that are virtualization, thematic learning, and learning personalization [8],[10],[40],[41]. These tendencies will give new understanding that there is quite a vague difference between formal schools and flexible learning environments. Also, it is relatad to access to almost all required sciences that enable them to learn outside schools, and control on what and how they learn on their own hands.

In learning, there are three approaches when educators develop a learning environment. Those are learning differentiation [42],[43], learning individualization [42],[44], and learning personalization [41],[45]. Learning differentiation and individualization bases on the paradigm of teacher-centered learning. While learning personalization bases on student-centered learning. There is a clear difference between the two paradigms on where learning control is. On teacher-centered learning, the educator tends to work hardest in the classroom to carry out learning. On the contrary, on student-centered learning, learners work harder to learn.

On learning individualization, the educator will accommodate the various needs of each learner. On learning differentiation, the educator will adjust learning needs for groups. Meanwhile, learners have the freedom to relate learning to their desires, talents, hobbies, and aspirations on learning personalization. The concept distinction of the use of the word "student" and "learner" will occur in learning activities on these approaches. It is not easy for educators to change this paradigm. Creating a learner is undoubtedly more essential than creating a student in the global community with problem complexity at this time.

### 3.4 Mobile Learning Community

Mobile learning is a part of electronic learning or e-learning that gives broader opportunities for mobile and more capabilities for student's learning. Thus, m-learning can be defined differently with e-learning related to students' mobility as learners. Teacher could arrange this learning everywhere since learners can take benefits from mobile technology. The perspectives of mobile learning covers four those are techno-centric, focusing on e-learning, formal education devices, and student-centered learning [14]. Nowadays, the emphasis of technology at schools is used to ensure effective learning implementation with new opportunities and encourage better learning performances.

The use of information technology to support a long-distance education system is vital. In the learning effectiveness, e-learning must give personal experiences and benefits similar to pleasure level and learning performance management if used in the traditional face-to-face classroom. With e-learning, the teacher and students need internet facilities to keep connected in interaction. The capability and interaction quality determine the sustainability of a long-distance education system.

Web-based long-distance education is also a community that has interaction between learners and the teacher inside [10],[46],[47]. A common difficulty in this kind of learning is moving teachers' habits in the classroom to virtual interactions involving a variety of components inside [11],[48]. The

existence of this system requires a change in the teacher's and students' mentality. The difference between the teacher's characteristics in teaching does not appear in this method. This method also needs to give learning information to learners. This information needs to be accessible and updated anytime. The information includes syllabus, schedule, announcement, learning participants, teaching materials, and assessment on learner achievement. As in face-to-face learning in the classroom, positive or negative attitudes and experiences in online learning will be formed by several factors. These are such as on how e-content is presented, the wealth of communication activities, or how far learners have opportunities to share and collaborate with the teacher and other learners. Also, learning strategies used could give opportunities to improve the critical thinking skills and self-directed learners [49],[50].

## 4. Conclusion

There are several critical summaries from the results of research related to the education equaty. Four essential factors observed influencing the success of mobile learning are policies of education management, ICT literacy of the teacher and learners, learning management skills, infrastructure and technology.

The education system of Indonesia is still in the transition process from the national exam score oriented to learner competency oriented. This transformation has not yet been fully realized in all school level. Even though school management and teachers have realized the significance of new competencies improvement, demand on cognitive aspect measurement is still relatively dominant. There is still a tendency at the school level that learners or the teachers are still limitedly allowed to use ICT in learning. The improvement in the structured utilization of mobile technology in learning needs adequate policy support from all educational management.

Research at schools in Java and outside Java shows that teachers and learners have relatively balanced ICT literacy. It means no need to worry that in the implementation, regions outside Java will be left behind. The high level of penetration on the use of ICT in Indonesia with equal distribution becomes one of the reasons resulting from the excellent literacy. However, the utilization of this technology in learning at almost all schools is still low. Even though in terms of ICT literacy of the teachers is good, the utilization of mobile technology for learning tends to be low. One of the main factors causing this situation is no policies that support or require the teachers to implement it. The results of training and assistance for teachers in some schools show that the teachers easily adjust in implementing learning strategies to achieve appropriate learning outcomes.

The internet network infrastructure as the primary support is relatively very good in Indonesia. The mobile learning research conducted in islands near the city also runs well in terms of internet network availability. There are many schemes from the regional government at the school level providing wireless fidelity (wi-fi) for learning. But the low access is still felt bay the some remote islands. The level of internet user access can be explained by the number of users and the total population in an area. This ratio can be a predictor of access levels. Another factor that determines the success of the use of the internet in learning is the level of ICT literacy. This literacy requires basic knowledge and needs related to literacy tools and information for selecting and sorting data.

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