

DEVELOPING OF ELECTRONIC TEACHING MATERIAL BASED ON MOBILE LEARNING IN THE WAVE SUBJECTS

PENGEMBANGAN BAHAN AJAR ELEKTRONIK BERBASIS MOBILE LEARNING PADA MATAKULIAH GELOMBANG

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ABSTRAK

Pada era yang serba maju dan modern, kecanggihan teknologi menyebabkan pembelajaran yang awalnya berjalan satu arah, dimana guru dan siswa saling bertemu dan berkomunikasi di dalam kelas, dapat dilaksanakan melalui bantuan teknologi.informasi. Seiring dengan perkembangan informasi, buku dan guru yang awalnya sebagai sumber belajar utama, saat ini sudah mulai mengalami perkembangan dimana sumber belajar yang berasal dari internet sudah mulai sering dimanfaatkan dalam proses pembelajaran. Mobile larning didefinisikan sebagai perangkat mobile yang dipergunakan dalam proses belajar mengajar. Mata kuliah gelombang sendiri merupakan salah satu mata kuliah yang wajib ditempuh oleh mahasiswa program studi pendidikan fisika semester 3. Mata kuliah ini menekankan pada konsep gelombang yang ditinjau secara matematis dan fenomenanya yang terjadi dalam kehidupan sehari-hari dalam bentuk bahan ajar elektronik. Tujuan dari penelitian ini adalah untuk mengembangkan bahan ajar elektronik dalam bentuk mobile learning. Adapun sampel dari penelitian ini adalah 80 mahasiswa semester 3 yang sedang menempuh mata kuliah gelombang. Hasil penelitian menunjukkan bahwa mobile learning yang sudah dikembangkan memiliki score validasi 3.8 dan termasuk dalam kriteria valid

ABSTRACT

In the advanced and modern era, technological sophistication led to learning which initially runs, in which teachers and students meet each other and communicate in the classroom, can be implemented through of information technology. Along with the development of information, where books and teachers who initially as a primary source of learning, are now beginning to experience growth from the internet. Mobile learning defined as mobile devices that are used in the learning process. The wave course is one of subject that must be taken by students of physics education in the third semester. This course emphasizes the concepts of wave were reviewed mathematically and the phenomenon that occurs in everyday life. Mobile learning developed in this study in the form of electronic teaching materials on subjects of waves. The aim of this study was to develop electronic teaching material in the form of mobile learning. The sample of this study is 80 students in the third semester students who are taking waves courses. The results show that mobile learning that has been developed has score 3.8 and included valid criteria.

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Keywords: Electronic Teaching Material, Mobile Learning, Waves Subject.

INTRODUCTION

Wave course is one of the subjects that must be taken by students of physics education

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in third semester. Competencies expected from this course is students have the ability to declare a description of waves in various media and the properties of waves and their application in everyday life , The contents of this course consist of harmonic oscillations, transverse waves, longitudinal waves, waves analysis in Fourier

series, Fourier transformation and the Dirac delta, and Wave Modulation. Topic and discussion about wave has been taught to students ranging from elementary level to the secondary level. Because it is so important concept in this course, then need more treatment in the implementation process of the lecture.

According to Arsyad (2008), in a learning process there are two important elements, the methods of teaching and learning media. Teaching method is a method or technique to implement the teaching plan in the form of real and practical activities in order to achieve the learning objectives, while learning media is itself a teaching aid that also affects the learning process. A harmonious combination between the methods of learning with instructional media will create the learning atmosphere more fun and meaningful.

In the advanced and modern era, technological sophistication led to learning which initially runs in one direction, in which teachers and students meet each other and communicate in the classroom, can be implemented through of information technology such as handphone, android, tablet, smartphone, etc. Education is fundamental step in every person's life to increase its popularity, availability and convenience for everybody. Information technologies present a lot of new tools and approaches which expand the infrastructure of the educational process (Andreicheva & Latypov. 2015). The need to access to the information regardless of time and place has increased the effects of mobile technologies and mobil learning, and it has also brought new strategies to the learning process (Uysal & Gazibey, 2010).

In recent years, the efficiency of constructivism learning method, the transition from computer based learning to web based learning and the improvement in technologies have made mobile learning as one of the most popular learning styles and mostly called M-learning. Mobile learning has transitioned from a subordinate method of electronic learning into its own educational area and it has become a new field of research (Pollara & Brousard, 2011). *Mobile learning* is mobile device that using as mediator in the learning process (Alexander, 2004). *Mobile-Learning* or M-learning are implemented to the learning process in modern education, where student can learn the matter anywhere and (Adegbija & Bola. 2015). *M-Learning* provides significant learning prospect for students who regularly use mobile devices like personal digital assistance,

android, smartphone and so on (Gedik, et al. 2012). The use of mobile phone more frequently when compared with the computer, because access is easier and popular as Facebook, YouTube, and Twitter indicating that the media are potentially used in learning (Goksu & Atici, 2013).

El-Hussein and Cronje (2010) opined that the use of mobile devices for learning can enlarge the scope of tertiary education and allow it to better student reach. Furthermore Schepam, et al (2012) states that the use of technology in the mobile learning benefits when applied in higher education because of the ease and process complex information in accordance with the conditions of student.

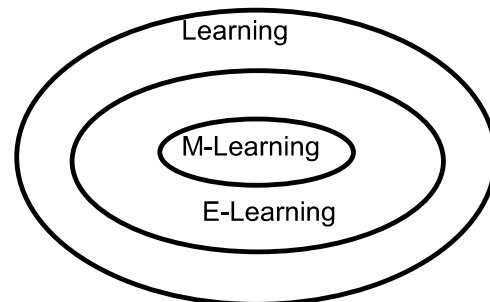


Figure 1. M-Learning as part of E-Learning (Sarrab. 2015)

The M-learning refers to the ability to access educational resources, tools and materials at anytime, from anywhere, using a mobile device (World Economic Forum Report. 2010). According the Slavkovic & Savic (2015), M learning can include: simple SMS messaging, Multimedia live classroom sessions, web and podcasting to audio, text recaps of lessons, educational video games, logical reasoning and problem solving aptitude games, multiple choice tests to reinforce content learning, audio-to text or text to audio application, mobile whiteboards for interactive discussions.

Mobile learning used in this study in the form of electronic teaching materials in the course of the waves. The development of mobile learning is expected to increase attention on the lecture material, makes learning persuasive and able to motivate learners to lifelong learning (lifelong learning). In addition, compared to conventional learning, M-learning allows for more opportunities for collaboration and informal interaction among learners.

The general aim of this research is to develop electronic teaching materials by using electronic devices such as cell phones and tablets in the wave subjects. This general aim

can be expanded into more specific objectives, there are to develop electronic teaching materials based on mobile learning, describe student learning, and describing the response of students during the learning using mobile learning in the wave course.

METHODS

This study involved 80 students majoring in physics education program of Faculty Teaching and Training Education of University of Jember who take courses wave. The class of the subject was divided into two parallel classes B and C. This type of research is the development of research using 4 - D models of Thiagarajan were reduced to model 3-D. Model of instrument development is suggested by Thiagarajan, et al (1974) which is adopted by Ibrahim (2008). The development of this model consists of four phases which is reduced to three phases, namely the Define phase, Design, Development. The research scheme shows in Figure 2.

Data collection instruments used in this study include validation sheets, documentation, observation sheets and questionnaires. Data that has been analyzed and presented in the form of graphs and tables criteria, and the average percentage score.

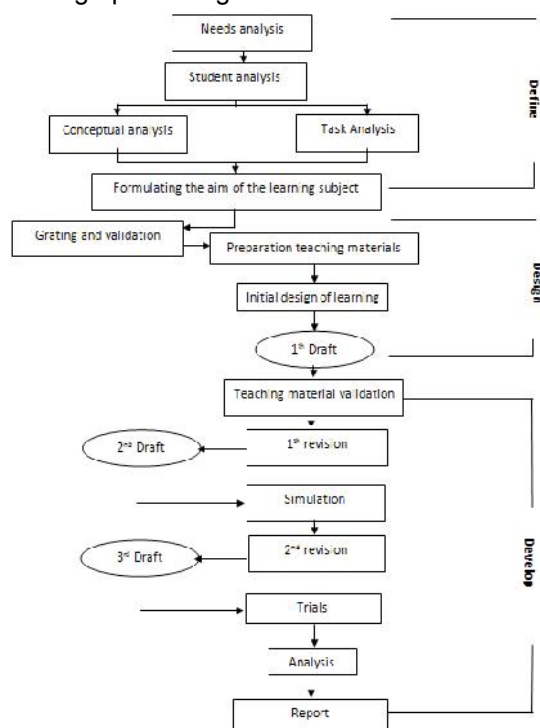


Figure 2. Schematic implementation of the Research Source : Adapted from Ibrahim (2003)

RESULTS AND DISCUSSION

The research type is development research which was conducted on a wave lectures for 8 sessions. Before implementing mobile learning research, the first step which was done is carried out a survey on the type of mobile phone used by the students Based on the results of a survey conducted on 80 students, there are 72 students using a smartphone while 8 students using a cellular phone. The result of the observation are presented in the following graph

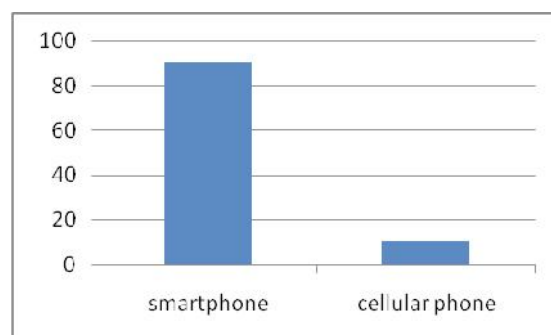


Figure 3. Graph survey of student mobile phone

Based on the results of surveys that have been done indicated that the development of mobile learning can be done because of 90 % of the subjects had a smartphone that can be used as mobile learning.

Teaching materials which is developed in this research is electronic form based on mobile learning using a smart phone in the waves subject. Mobile learning is expected to assist students in learning, which can be accessed anytime and anywhere. By utilizing mobile learning then students time to learn to be more than the usual time, which was originally only in schools and the students can learn independently without hindered by space and time. In addition, the use of mobile learning to learn will reduce unproductive time, for example, mobile phones are usually more widely used for communications or self-existence in social networking. Perhaps, there is a special time that is used for learning, reading and writing tasks by mobile learning.

The implementation of the development of electronic teaching materials based on wave course of mobile learning is using Hot Lava Mobile software (HLM). This software is free software or open sources, so as ceremonial or legalization of this program is guaranteed. HLM

program installed on the computer, then the waves teaching materials that have become incorporated in the program, and then adjusted to the size of smartphones. Terms of use of this application is very simple, where smart phone used to have a java program.

After the electronic teaching materials based mobile learning prepared, first performed validation experts to determine the material aspect of clarity, legibility, breadth of content and form of presentation. At the beginning of the process of teaching material validated by 3 valuator who is a lecturer at the University of Jember who have skills in the field of information technology. The validation results shown in the following Table 1.

Table 1. Results of the validation of electronic teaching materials based mobile learning

Valuing aspect	score	criteria
Readability of electronic teaching materials	3.67	Clear and can be used
Clarity of writing formulas and symbols	4.00	Very clear and can be used
Depth of content layout	3.33	Quite depth
	4.00	Quite interesting
Completeness of Instructional Materials	4.00	Complete and can be used
Average	3.80	

Note:

- 1 - ≤ 2 not valid
- 2 - ≤ 3 less valid
- 3 - ≤ 4 Valid
- 4 - ≤ 5 very valid

Based on the results of the expert validation in the table above, it can be stated that the teaching materials of wave subjects has score of 3.8 which is included in the valid category. Characteristics of matter waves tend to be mathematically and emphasizes the concepts are very appropriate when made in mobile learning..

After validating experts and instructional materials declared valid, the researcher distribute teaching materials to students through Bluetooth applications on smartphones, so the students can learn outside of the classroom through their smartphones. This research was conducted for 2 months or as much as 8 times. In this study, the learning process is carried out not only carried out independently through mobile learning but still a meeting or lecture in the class. This is done to determine the extent of students' understanding of the material and

monitor the use of mobile learning.

To determine the response of students, questionnaires were distributed to 80 students and it has six criteria, there are the clarity of the content in mobile learning, coherently of the content, helping students in the self learning, the legibility of the writing of teaching materials, usefulness of mobile learning, and improvement of mobile learning. The results of the questionnaire responses of students shown in the following table

Table 2. The response of students to electronic teaching materials based mobile learning

Questionare criteria	Score		
	High (%)	Middle (%)	Low (%)
Clarity of the content	81.90	19.10	
Coherently of the content	85.00	15.00	0.00
Helping students in the self learning	93.10	6.90	0.00
Legibility of the writing of teaching materials	63.33	30.00	6.67
Usefulness of mobile learning	85.71	14.29	0.00
Improvement of mobile learning	72.00	24.00	4.00

From 6 questionable aspects to the students to determine their response, it turns that teaching materials in the form of mobile learning is helping students to learn. This can be seen in Table 2 in which 93.10 % of respondents expressed high which means that electronic teaching materials based on mobile learning that has been developed is helping students to learn independently because of the ease of access and practical to open or operate. This is consistent with the research of Sepala & Alamaki (2003) where mobile learning enables students to learn outside of the class through mobile phones or tablet PCs, and it can be accepted as perfect form of flexible and self learning.

Research results Shin et al (2011) also stated that students are more satisfied and motivated when the teacher in the learning process using electronic devices, because M-learning can help students to develop their academic abilities. In addition, research conducted Righie (2012) also showed that there is increased participation and cooperation collaborative students during the learning using mobile technology. Taleb, Ahmadi, and Musavi (2015) also stated that the ability to cooperate in the ideas of students in mathematics using

M-learning is increasing and students are more satisfied because it can solve math problems or issues using their own ideas. Other studies that support is Kutluk & Gulmez (2014) states that the use of mobile learning can provide opportunities for students to conduct an investigation and critical thinking skills of learning which is only done in the classroom and can effectively improve the learning behavior more positive ,

Still based on the results of the questionnaire, for read ability factor get response about 63.33%. This is because the type of mobile phone or smartphone owned student is not the same or different each other, so the image resolution or the writing is not so clear. The interesting thing about the student response was the improvement of mobile learning indicated by 72.00%. This shows the interest of students towards mobile learning that has been developed and used in learning of waves course.

The use of technology in learning process is necessary in the modern era. This is consistent with studies that have been conducted by Adegbija et al (2015), which states that more students showed interest in the implementation of learning by using mobile learning. Results of research Al Hamdani (2013) also states that all students in research more enthusiastically when learning is done by using a mobile device, because of the suitability of the interaction of technology with their devices. Shortcomings inherent in the development of teaching materials electronically in the form of mobile learning really highly recognized by researchers as the teaching materials used are very simple and limited, so it needs further development of the application and case examples, as well as the questions that students clearer and more helped.

Utilization of mobile learning in teaching is very assist students in learning. However, this may be as good as the teacher as teachers have a good knowledge about the technology. Some obstacles encountered in this study are that not all mobile phone has Java software so that the program cannot be read or sent.

CONCLUSION

The conclusions obtained from this study are based electronic teaching materials developed mobile learning has score 3.8 and including the valid category and can be used for the learning process as well as useful and help students in learning.

Suggestions from this research is to develop mobile learning using other devices such as tablets and android

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