Improving The Efectiveness of Student's Learning Engagement by Build-up Mobile Learning Management System (M-LMS)

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ABSTRACT
This article proposed the effectiveness of the Mobile Learning Management System (M-LMS) to improve student's learning engagement, particularly in higher education. Mobile Learning is a development of the e-learning Learning Management System (LMS) with the concept of the e-learning model utilizes internet facilities and mobile devices. The survey indicated that the lack of student's motivation, as well as lack of activities and, do not engage closely with the learning process to be the main problems of the learning system. Build up the M-LMS is one of the alternatives to improve students learning engagement and student learning achievement. How effective the M-LMS to enhance students learning engagement and achievement were tested in this study. The research was conducted by using a quasy experiment that involved 51 students (26 students from the experiment group and 25 students as a control group) and 3 lecturers who participated in lecturing a subject matter of human and computer interaction. The result revealed that the M-LMS supported and affected the engagement of students learning as well as improved students' achievement.

Keywords: Mobile Learning Management System, effectiveness, practicalities.

1. INTRODUCTION

The 21st century is characterized by the development of information and communication technology. The world of education and learning process is one area that cannot be separated from the impact of information and communication technology. The importance of learning competence in the XXI century States that the Information and Communication Technology (ICT) is widely accepted as a strategic advantage in improving the quality of education and learning[1][2]. We use technology to define and shape our thinking[3][4]. Points out about connectivism, where is the standard for students in the 21st century is the technology changes our brain (rewiring our brain)[5]. In connectivism, learning is defined as an activity of knowing up to the activity of creating actionable knowledge.

The learning management system (LMS) with the concept of the e-learning model, which uses internet facility and mobile devices, is also known as Mobile Learning Management System (M-LMS). Learning Management System (LMS) is a self-contained webpage with embedded instructional tools that permit faculty to organize academic content and engage students in learning[6]. To date, student engagement towards Learning in Management of Informatics and Computers High School (STMIK) NURDIN HAMZAH is less due to the learning system used is more traditional or teacher-centered learning, where are the lecturers and students meet at a place and at a particular time (directly face to face in the classroom).

Consequently, it affects the results of student learning and achievement. Therefore, along with the development of increasingly sophisticated technology, this system is less effective and unable to

move dynamically. This can be exemplified by the existence of various activities of the lecturers outside of learning or class, or the existence of the same course at different class, or the course that collide with other courses in the same semester, in which it causes the lecturer cannot do the job properly. Besides, not all the students could attend traditional classes due to some reasons, such as have to attend seminars, workshops, organizational, and work needs. The dynamics that needed are the creation of effective communication, namely the more accessible communication between the lecturers and the students. This dynamism can not be confined by a particular space and time (scheduled classes). Therefore, face to face meeting is no more extended significance. The term M-Learning or Mobile Learning refers to the use of handheld devices such as PDAs, mobile phones, smartphones, laptops, and information technology devices that will be widely used in teaching and learning[7].

To achieve the accomplishment and good learning outcomes, it needs to maintain and foster student engagement. Student engagement refers to the extent of a student's active involvement, the degree of attention, interest, and passion that students show when they take part in the learning process[8][9]. Student engagement is one of the most important factors associated with improved learning, and much of the research to date has indicated the importance of student engagement leading to a positive impact on learning outcomes [10][11]. The more engaged the students in learning, the more they will learn and getting progress in their learning. The involvement of students is generally considered better if a lot more learn or practice a subject[12]. M-LMS is an application that could accommodate learning activities so that the students tend to involved, able to understand repeatedly, and prepared to know their learning progress. The purpose of this study was to devolved the M-LMS in STMIK NURDIN HAMZAH. Also, it aimed to see the effectiveness of M-LMS in increasing the engagement of students in the learning process, particularly in the subject of human and computer interaction. Furthermore, it was intended to find out its effect on the output or achievement of the students.

2. LITERATURE REVIEW

2.1 M-LMS: Concepts and applications

Mobile Learning Management System (M-LMS) is a learning method that can improve student's engagement and learning outcomes. It can be seen from some relevant research facts. Points out that the effectiveness of teaching and academic achievement in higher education should consider the development of e-learning teaching strategies that encourage greater engagement and also consider the different learning styles found within each student[13]. LMS is at the forefront of online technology that makes a serious impression of learning and teaching patterns in college[14][15]. Also state that the LMS should be able to handle multiple modes of delivery and automate the process of complex student enrollment, notes, transcripts, timelines, and reports, and should include evaluation, assessment and testing capabilities[16]. The most recommended category of LMS that has been developed for the academic environment is learning content management, evaluation, and communication.

Mobile Learning System facilitates communication between educators and learners to become more active in the classroom by helping learners in building the required communications[17]. M-Learning combines and linkages between technology and education: Including nomadic, institutional, home, children and adult learners and independent learning environments, school spaces, networking, internet-based, distance, collaborative, asynchronous and synchronous, so that attracted the attention of new generation for distance learning (M-learning)[18]. The M-learning system is not to replace the traditional class, but it can be used to improve the learning process in schools and universities.

2.2 The motivation for the study

Technology advances enable people to access various kinds of mobile devices, including laptops, smartphones, and android. A preliminary study indicated that 48 out of 51 students or around 94% of the total respondents claimed to have a personal mobile device such as smartphones, android, and laptop. Likewise, with the lecturers, 18 lecturers out of 20 or around 90% declared that they have personal mobile devices. Considering these results and to overcome the problems that have been mentioned, it is deemed necessary to build a system to support the existing education system. This system is the development of e-learning or also called Mobile Learning Management System (M-LMS). M-LMS is an educational system using the internet as the medium where the lecturers can upload lecture materials on the M-LMS website, and the students could learn given materials through mobile devices by visiting and opening the M-LMS site. Therefore,

this article was written to analyze the implementation of M-LMS related to the ability of this system to increase student engagement in the learning process as well as improve their learning achievement.

The implementation of M-LMS in universities refers to several assumptions: a) Lecturers and students have good knowledge and skills to design learning using M-LMS. b) With the M-LMS, lecturers have a high desire to convince students to improve the quality of learning using this system. c) M-LMS can enhance the quality of lectures and learning outcomes. The primary purpose of this assumption is to increase student engagement and learning outcomes, considering the high percentage of mobile use by students and lecturers, as well as the skills and knowledge they possess. Therefore, in this article we need to explain several parts, that is part 2 about the Framework of Mobile-learning Management System (M-LMS), part 3 about the method, part 4 about the implementation Of Mobile Learning Management System (M-LMS) to improve the effectiveness of student's learning engagement and part is 5 conclusions.

2.3 The framework of Mobile-learning Management System (M-LMS)

To illustrate the development design of the M-LMS, it requires the framework of M-LMS as could be seen in Figure 1 below:
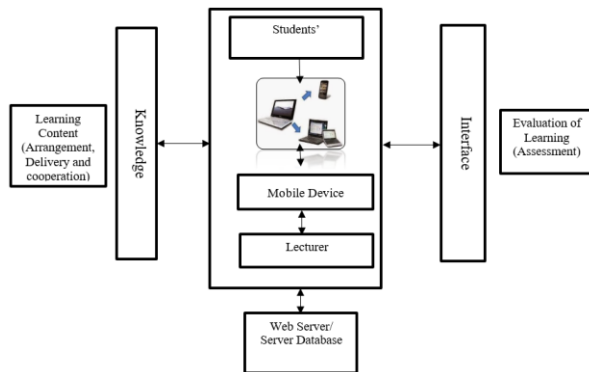

Figure 1. The Framework of M-LMS

From the figure 1, it can be explained that the M-LMS framework consists of learning content, learning evaluation, the M-LMS users (students and lecturers), web server and mobile devices (handphone, laptop, notebook, smartphone, and PDA). To use the Mobile Learning Management System (M-LMS), a web server is required to manage learning content, learning evaluation, and M-LMS users (lecturers and students). In the setting section of learning content, the lecturers could download and

searching all materials needed in the learning process. In addition, the lecturers could develop learning based on words or text, images, audio, video, graphics, and animation. The students also gain more knowledge to solve problems, new ideas, as well as strengthen their knowledge.

Delivery could be done through the database server and web server. The database server contains a login address and password where the users are immediately able to get their personal information and the schedule of their course. From the webserver, the students can download the contract of lectures, syllabus, coursework, Semester Learning Program Activities Program (RPKPS), and teaching materials. The section of cooperation could be used to share knowledge between students as well as with their lecturers based on the information gathered or obtained as well as their experiences. The delivery section acts as a mobile-content that could be accessed via a wireless network such as wifi, Bluetooth using tools (web-based learning) like PDA, notebook, tablet, laptop, and smartphone.

In the section of learning evaluation, the lecturers evaluate the performance of students by transparently assessing their understanding and ability. In addition, the students could access information about the results that they gain in learning by accessing the network using a mobile device. This could be done at any time, including during the semester break.

3. METHOD

3.1 Research Design

The research was conducted using a quantitative method by analyzing the results of questionnaires on the implementation of a mobile-based learning management system in higher education. The tabulation technique that was done is by determining the total score, average score, ideal score, and the percentage level of respondent achievement who have used M-LMS application. The test of data analysis was aimed to determine the results of the Mobile learning management system in pretest and posttest on each control class and experiment class.

To verify the effectiveness of constructed M-LMS, it was tested using a measuring tool or instrument. The empirical testing process was also conducted to get a picture of whether the implementation of M-LMS is effective. Therefore, the trials were conducted twice as follows: a) small scale field trials (limited) and (b). Large scale field trials (more extensive). Large-scale field trials were

done by using research design [19], that is a classical experimental design which can be described as follows:

Table 1. Classical Experimental Design

R	O1	X	O2
	O3		O4

The classical experimental design has four groups of data (O), namely, data pretest of treatment group (O1) and control group (O3) as well as data posttest of treatment group (O2) and control group (O4). Large-scale field trials were conducted by doing experimental processes for the control group and the experimental group. The students who performed the conventional teaching process are categorized as control class. Meanwhile, the innovative group students are the students who practiced lectures by using Mobile Learning Management System (M-LMS). The T-test can do the effectiveness of M-LMS on improving learning. The t-test is performed on Posttest data. The t-test on Posttest data aims to see the difference between the control class and the experimental class. Where is the control class without using M-LMS and experiment class using M-LMS

The effectiveness measurement of Mobile-Based LMS was formed and developed from the Technology Acceptance Model (TAM)[20]. TAM is one of the models built to analyze and understand the factors that affected the acceptance of using computer technology. TAM measurement method consists of two main dimensions, as shown in table 2:

Tabel 2. Technology Acceptance Model (TAM)

Main Dimensions	Indicator
Perceived ease of use)	Easy access, attract student interest, ease interaction with fellow students and Lecturers, help the student learning process Increase effectiveness in work, Minimize loss of information, Faster in doing Job tasks
PerceivedUsefullnes	Increase effectiveness in work, Minimize loss of information, Faster in doing Job tasks

The measurement tool of effective mobile LMS is a set of dimension and question that was developed from the existing instruments in TAM. By the method of TAM, the measurement's level that was used is the range of scale from 1 to 5, as shown in the table below:

Table 3. The Measurement Scale on Instrument

No.	Scale	Score
1	Strongly Disagree	1
2	Disagree	2
3	Doubt	3
4	Agree	4
5	Strongly agree	5

3.2 Research instruments

The instrument is one of the determinant factors for the success of the research. Instrument functionates as a tool in collecting the necessary data. In this study, there were four instruments used as tools in collecting essential data, namely: the instrument of needs analysis, the instrument of validity, the instrument of practicality, and the instrument of effectiveness. The instrument of need analysis in this study is in the form of a questionnaire that was used to see the efficacy and the gaps of the lectures to fix it by knowing the cause. Therefore, the goals of learning could be achieved.

To validate the developed instrument in this research, the strategy that was pursued is experts judgment. Then, it was continued with the exploration of the feasibility test by the users through focus group discussion (FGD). Every item of the instrument was designed based on the indicators that have been constructed in every aspect of the result. The measurement tool of LMS practicality mobile-based was formed and developed from the webqual 4.0 measurement method. This method consists of 3 main dimensions, as shown in table 4.

Table 4. Main Dimension on the Webqual 4.0

Main Dimension	Indicator
Use	easy to use, attract student interest, help the student learning process
Information Quality	Accurate, on time, reliable
Interaction Quality	The smoothness of interaction, communication, response

Source: Barnes and Vidgen (2001)[21]

The Mobile LMS practicality measurement tool is in the form of dimension arrangement and question factors. It was developed from dimension arrangement and question factors that are contained in the instrument webqual 4.0. The measurement level on the elements was developed according to webqual 4.0 method, that is using the scale from 1 to 5.

Mobile-based LMS effectiveness measures were formed and developed from the Technology Acceptance Model (TAM) theory first introduced by Fred Davis in 1986. TAM is one of the models built to analyze and understand the factors that affect the acceptance of the use of computer technology. These factors include usefulness and ease of. From the results of research that has been done means that M-LMS system that has been applied has been used real by the user because they feel the ease and benefits of an information technology system. Mobile-based lMS effectiveness measures are developed and developed from TAM measurement methods.

4. RESULT AND DISCUSION

4.1 Student Engagement on the M-LMS Implementation

Implementation of M-LMS to Student Engagement can be explained from students' involvement in learning activities such as accessing M-LMS, doing tasks, quiz, active in chat forum and taking online exam using M-LMS application, as follows: from 26 students tested with M-LMS, 23 of them frequently access M-LMS application or about 88% of total students who use M-LMS. And 24 students or 92% of them use M-LMS to do the task. Students who have followed the quiz are as many as 22 people or about 85%. The number of active students in the chat forum is 20 students or about 77%. While the number of students who take the online exam is 22 students or 85%, from the data, it can be concluded that from 26 students tested, the active use of M-LMS application is 85%. From that percentage, it can be seen that student engagement is quite high against M-LMS.

The results of the study found that the M-LMS contributes to the involvement of students and lecturers in the learning process. This can be seen from the result of Postest taken from three times of Postest that is on the first Postest 80.46, the second Postest 82.15, and the third potest 85.04. From the Posttest results, it can be seen that the student learning outcomes have increased with an average of 82.55. Mobile technology can also enable conversations between students in a real and virtual world and boost student engagement. If we can design technology that facilitates conversations between students and lecturers, then they gain experience of education together. Mobile education does not replace formal education but offers ways to extend learning support beyond the classroom.

Based on the explanation above, it can be concluded that the learning process with mobile learning without leaving the traditional learning process will be easy and convenient for students to carry out the contents at anytime and anywhere. The learning process using M-LMS has proved given a positive impact and effective in improving student learning outcomes. In addition, these results also depict their higher expectations towards the developed M-LMS. Considering this result, it can be indicated that the M-LMS has constructed their understanding of the learning process so they can improve their learning outcomes. With mobile devices that are a new way of learning, which is adaptive for students, it will be easy and convenient for students to carry out learning content at anytime and anywhere.

4.2 Effectiveness of M-LMS According to Achievements of students Learning Outcomes

From the test results given to the control class and the experimental class, it can be identified and analyzed as follows, there is a significant difference in learning outcomes between students taught by M-LMS and students taught not using M-LMS. Student learning outcomes shown with M-LMS were higher than student learning outcomes that did not use M-LMS (X A1 (1) B1 = 80.00> X A2B1 = 73.00).

Second posttest of t-test, there is a significant difference in learning outcomes between students taught by M-LMS and students taught not using M-LMS. Student learning outcomes shown with M-LMS were higher than student learning outcomes that did not use M-LMS (X A1 (1) B1 = 82.00> X A2B1 = 71.00).

Tird posttest of t-test, there is a significant difference in learning outcomes between students taught by M-LMS and students taught not using M-LMS. Student learning outcomes taught with M-LMS were higher than student learning outcomes that did not use M-LMS (X A1 (1) B1 = 85.00> X A2B1 = 73.00).

Therefore, it can be concluded that the t-test results show a significant difference in learning outcomes between a class that used M-LMS (experimental class) and the class that did not use MLMS (control class), it can be concluded that :

1. The average grade of posttest of class control is 73 while the average grade of posttest of an experimental class is 80

2. the average grade of the posttest of class control is 71, while the average grade of the posttest of an experimental class is 82.

3. The average grade of posttest of class control is 73 while the average grade of posttest of an experimental class is 85

This proves that the use of M-LMS gives positive impacts and effective in the learning process

4.3 The Test Result of Effectiveness of M-LMS Usage According to Lecturer's Perception

From the perception of ease (Perceived Ease of Use) on the users of lecturers, the conclusion that could be taken is the average of the items that have been asked, around 92% respondents answered is agree with which means that this system is easy to use. The structure of the menu of MLMS is easy to understand, whereas 45% of respondents are agreed, and 50% strongly agree. The ease of using M-LMS accelerates the work/teaching tasks, 55% of respondents is agreed, and 25% strongly agree. The perception of usefulness (benefit) shows that 50% of respondents are agreed, and 25% strongly agree that the M-LMS can increase the effectiveness of work. As many as 40% of respondents are agreed, and 40% strongly agree that the use of M-LMS minimizes the loss of information in assigning lecture assignments to the students, obtaining the required information, faster and easier in doing tasks. Overall, respondents answer that the M-LMS is very useful as one of the mobile-based learning model.

5. CONCLUSION

This research purposed to developed M-LMS in higher education/college. The development of this method aimed to increase students' engagement in the learning process as well as improve their achievement. Research findings depict that the students who use M-LMS in learning to get positive impacts on their engagement and achievement compared to the students who did not use it. It can be concluded that the mobile learning management system has a significant positive impact on improving student engagement and achievement. Therefore, the use of mobile learning in higher education could be maximized to achieve the goal of learning. In addition, it could be a solution for the lecturers who cannot attend the class. The expectation of students and lecturers on the use of mobile technology in learning is significantly high. Thus, it should be an attention/consideration by colleges, whether the owner, management, lecturers, and the team of information and technology (IT) of that college. The implication of this research is how to realize the M-LMS as a learning process in higher education. Therefore, the existence of a mobile learning management system could improve student's engagement as well as their achievement. a learning process by using a mobile learning system could improve student activity and understanding in the classroom.

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