Implementation of Mobile Learning Management System (MLms) To Improve the Effectiveness of Student's Learning Engagement

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Implementation of Mobile Learning Management System (M-Lms) To Improve the Effectiveness of Student's Learning Engagement

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Abstract-A preliminary survey indicated that the lack of students motivation, participation and engagement in learning process is the main problems of learning system that need to be solved. This article proposed the effectiveness of Mobile Learning Management System (M-LMS) to improve student's learning engagement particularly in higher education. LMS with the concept of e-learning model utilizes internet facilities and mobile devices which allow the students to access the material at anytime and anywhere. Therefore, the M-LMS is one of the alternative to improve students learning engagement and achievement. The research was conducted byusing quasi experiment that involved 51 students(26 students from experiment group and 25 students as a control group) who take the subject of Human and Computer Interaction. It also involved 20 lecturers from various subjects as respondent.The result revealed that the M-LMS supported and affected the engagement of students learning as well as improved learning outcomes/achievement.

Keywords: Mobile Learning Management System (M-LMS), Students Learning Engagement, Learning Outcome

1. Introduction

The 21th 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. Chavalee et.al, (2015) [1] states that the Information and Communication Technology (ICT) is widely accepted as a strategic advantage in improving the quality of education and learning. The era of Information Technology, there is a need to improve the quality of education now with better measurement criteria (Abadi et al, 2018)[2] We use technology to define and shape our thinking.

George Siemens (2014) [3] points out about connectivism, where is the standard for students in the 21st century is the technology changes our brain (rewiring our brain). In connectivism, learning is defined as activity of knowing up to the activity of creating actionable knowledge.Learning management system (LMS) with the concept of e-learning model which use 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 (Laster, 2005) [4].

This system of learning is very popular today. Currently, the lecturers are required to be able to utilize technology as much as possible to support the learning process. One of the way is by master the information technology or IT especially as a supporting medium of teaching materials to create effective learning. So that,it can give the opportunity for students to experience the real learning process. Besides, it also improves student learning outcomes. To date, student engagement towards Learning in Management of Informatics and ComputersHigh School Nurdin Hamzah is less due to the learning system used is more traditional or teacher centered learning, where is the lecturers and students meet at a place and at a certain time (directly face to face in the classroom).

Consequently, it affects the results of student learning and achievement. Therefore, along with the development of increasing 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 course in the same semester, in which it causes the lecturer cannot do the job properly. In addition, 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 is the creation of effective communication, namely the easier communication between the lecturers

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and the students. This dynamism can not be confined by a particular space and time (scheduled class). Therefore, face to face meeting is no longer significance. According to (J.Hemabala and Suresh,2012) [5].The term of 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.

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 (Reeve, 2012; Trowler, 2010) [6].Student engagement is one of 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 (Carini, Kuh, & Klein, 2006; Klem & Connell, 2004; McMahon & Portelli, 2004) [7]. The more engaged the students in learning, the more they will learn and getting progress in their learning. According to Robert C et.al, (2006) [8] ,the involvement of student is generally considered better if a lot more learn or practice a subject. M-LMS is an application that could accommodate learning activities, so that the students tend to involved, able to understand repeatedly and able to know their learning progress. The purpose of this study was to developed the M-LMS in Management of Informatics and ComputersHigh School Nurdin Hamzah. In addition, it also aimed to see the effectiveness of M-LMS in increasing the engagement of students in 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.

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 in some relevant research facts. Timothy Rodgers (2008) [9] point outs 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.

According to Coates (2006) [10], LMS is at the forefront of online technology that makes a serious impression of learning and teaching patterns in college. Schar and Krueger (2000) [11] 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. The most recommended category of LMS that has been developed for the academic environment are: learning content management, evaluation and communication.

In addition, Keskin & Metcalf (2011) [12] reveal that mobile learning is very promising in the development of education in the future. Inline with that, Kim, et.al (2013) [13] also point out that mobile technology has a very promising potential in order to create new experiences in learning. Thus, the development of mobile learning can be useful in order to achieve the main goal of education, namely; the intellectual life of the nation by providing new experiences in learning in accordance with technological developments. Barati and Zolhavarieh (2012) [14] state that Mobile Learning System facilitates communication between educators and learners to become more active in the classroom by helping learners in building the required communications.

Moreover, Mohamed Sarrab et.al (2012) [15] point outs that 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). M-learning can be used to solve the problems of traditional learning systems. Both teachers and students need right and useful system for interacting each other and facilitating the teaching system. 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.

Furhtermore, Sharples et.al (2007) [16] point out that mobile technology enable learners to learn by exploring their world in ongoing communication with and through technology. Mobile technology also enable conversations between learners in the real and virtual world as well as enable virtual conversations between students and their lecturers to gain a mutual education experience. Mobile education does not replace formal education. There is more than one web around the world replacing textbooks and offers ways to extend learning support beyond the classroom.

1.3 Motivation for the study

Some problems often arise in the learning process which lead to ineffectiveness of this process. For example, the lack of meeting time in class which caused not all materials could be delivered by the lecturers. Consequently, the students have to copy or duplicate the materials from the lecturers. In addition, it is difficult to find a suitable time for consultation between students and the lecturers.in the other case, sometime it is difficult for the students to obtain learning sources which will affect the development of their knowledge.

On the other hand, technology advances enable people to access various kind of mobile devices including laptop, smartphone and android. 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 smartphone, android and laptop. Likewise

with the lecturers, 18 lecturers out of 20 or around 90% declared that they have personal mobile devices. Considering these result and in order 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 M-LMS site. Therefore, this article was written to analyze the implementation of M-LMS related to the ability of this system in increasing student engagement in 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 knowledges 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 improve the quality of lectures and learning outcomes. The main purpose of this assumption is to increase student engagement and learning outcomes considering 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 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. 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:

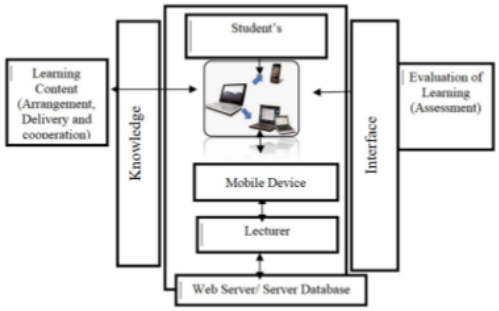

Figure 1. The Framework of M-LMS

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 Mobile Learning Management System (M-LMS), 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 that needed in the learning process. in addition, the lecturers could developed learning based on words or text, images, audio, video, graphics and animation. The students also gain more knowledge in order to solve problems, new ideas, as well as strengthen their knowledge.

Delivery could be done through database server and web server. The database server contains login address and password where the users are immediately able to get their personal information and the schedule of their course. From the web server, the students are able to 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 in 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 mobile-content that could be accessed via 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 assessing their understanding and ability in a transparent manner. In addition, the students could access information about the results that they gain in learning by accessing the network using a mobile device. This is could be done at anytime including during the semester break.

3. Method

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3.1. Research Design

The research was conducted using quantitative method by analyzing the results of questionnaires on the implementation of mobile-based learning management system in higher education. In addition, also by observing more deeply whether those system could improve student's learning and achievement, especially the subject of human and computer interaction which is statistically processed. 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 Mobile learning management system in pretest and posttest on each control class and expriment class.

To verify the effectiveness of constructed M-LMS, it was tested using a measuring tools or instrument. The measurement tool of M-LMS effectiveness was established and developed from the theory of Technology Acceptance Model (TAM). To ensure the product that produced is in accordance with the expectation, thus, in this research, the empirical testing process was also conducted with the goal 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 was done by using research design according to Mulyatiningsih (2013: 98), that is *classical experimental design* which can be described as follows:

Table 1. *Classical Experimental Design*

	O1	X	O2
R			
	O3		O4

The classical experimental design has four groups of data (R) 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 control group and experimental group. The students who performed conventional teaching process are categorized as control class. Meanwhile, the experimental group students are the students who practiced lectures by using Mobile Learning Management System (M-LMS).The effectiveness of M-LMS on improving learning can be done by T-test. The t-test is performed on Postest data. The t-test on Postest 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 IMS were formed and developed from the Technology Acceptance Model (TAM) theory that first introduced by Fred Davis in 1986. TAM is one of model built to analyze and understand the factors that affected the acceptance of using computer technology. These factors include usefulness (the user is confident that his performance will improve by using this system) and the ease of use (the user believes that by using this system will make them free of trouble). The results of research that has been done indicate that the M-LMS applied by user due to the ease, usefulness, and benefits of the information technology system. TAM measurement method consists of two main dimensions as shown in the table 2:

Table 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 student learning process Increase effectiveness in work, Minimize loss of information, Faster in doing Job tasks
Perceived Usefullnes	Increase effectiveness in work, Minimize loss of information, Faster in doing Job tasks

Source: Davis Dan Venkatesh (1996) [17]

The measurement tool of effective mobile LMS is a set of dimension and question that was developed from the existing instruments in TAM. In accordance to 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	Skala	Skor
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 determinant factor for the success of research. Instrument functionates as a tool in collecting the necessary data. In this study, there were four instruments used as tools in collecting necessary 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 questionnaire which was used to see the effectiveness and the gaps of the lectures in order to fix it by knowing the cause. Therefore, the goals on learning could be achieved.

To validate the developed instrument in this research, the strategy that was pursued is *experts judgment* (Linstone & Turoff, 2002) [18]. Then, it was continued with the exploration of 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 result according to Abadi & Widyarto (2018) [2].

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 the table 4.

Table 4. Main Dimension on the Webqual 4.0.

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

Source : Barnes and Vidgen (2001)

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

Table 5. The level of measurements on the instruments

No	Scale	Score
1	Strongly Disagree	1
2	Disagree	2
3	Doubt	3
4	Agree	4

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 usefullnes (the user is confident that his performance will improve using this system) and ease of use (the user believes that using this system will free him of the trouble). 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. The method is composed of two main dimensions shown in Table 6 that are designed.

Table 6. *Technology Acceptance Model*(TAM)

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

Source: Davis Dan Venkatesh (1996) [17]

The LMS mobile effectiveness measurement tool is a set of dimensions and question factors developed from the arrangement of dimensions and factors of questions or questions contained in TAM instruments. level measurements on the factors developed in accordance with the TAM method is using a scale of 1 to 5 levels of measurement and shown in Table 7 below:

Table 7. Level of Scale Measurement on Instruments

No	Skala	Skor
1	Strongly Disagree	1
2	Disagree	2
3	Doubt	3
4	Agree	4
5	Strongly agree	5

4. Results and Discussion :The implementation of mobile learning management system (M-LMS) to improve the effectiveness of student's learning engagement

a. Student engagement on the M-LMS Implementation

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The implementation of M-LMS towards student engagement can be explained as follows: 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 study found that the M-LMS contributes to the involvement of students and lecturers in learning process. Esteves, Fonseca and Martins (2009) [19] explain that technology is often used as a tool to improve student engagement. One of technology that can help students is M-LMS that is a learning using e-learning, which is expected to improve student engagement. Learning with M-LMS is expected to create a positive learning experience for students. This study will also look at how students' perceptions or views on M-LMS in the course of human and computer interactions that they have contracted in the odd semester. To see this perception, the questionnaire of evaluation and M-LMS implementation have been given. The M-LMS that have been designed by researchers can improve student learning outcomes. 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 Postest results, it can be seen that the student learning outcomes have increase with an average of 82.55. Mobile technology can also enable conversations between students in real and virtual world and boost student engagement. If we can design technology that enables conversations between students and lecturers, then they gain experience of education together. Mobile education does not replace formal education but offers the ways to extend learning support beyond the classroom.

Based on the explaination 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. Therefore, there is more opportunity to learn the content / learning content in extra-curricular time and improve student engagement and student learning outcomes. 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 can improve their learning outcomes. In line with that, Attewell (2011) [20] formulate that M-learning can give a positive impression to several areas: 1) M-learning helps learners to improve their skills, 2) M-learning helps learners to focus their learning for a longer period of time 3) M-learning helps improve self-esteem, 4) Mlearning helps improve self-confidence. Similarly, according to Raja Shekar (2011), the current learning process is a student-centered learning process using mobile devices. 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 any where.

b. Effectivenessof M-LMS according to achievements of students learning outcomes

The result of pretest for control and experimental classes shows that there is no different.It means that control and experiment classes having the same level of ability. Therefore, theseboth classes were given treatment. The t-test is performed on Postest data. The t-test on Postest data aimed to see the difference between the control class and experimental class. Where is the control class without using M-LMS and experiment class using M-LMS. From the results of the test given to the control class and the experimental class, it can be identified and analyzed as follows:

The t-test of first posttest

From the test results given to the control class and the experimental class, it can be identified and analyzed as follows:

Table 8. Summary of First posttest of t-test

Learning Outcomes	P_{Value}	Condition	Test Decision
Control Class (class does not use M-LMS)	0,000	< 0,05	There is a difference
Experiment class (class using M-LMS)	0,000	< 0,05	There is a difference

Based on the result of t-test of posttest in the table 8, 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 = 80.00> X A2B1 = 73.00).

Second posttest of t-test

From the test results given to the control class and the experimental class, it can be identified and analyzed as follows:

Table 9. Summary of second posttest of t-test

Learning Outcomes	P_{Value}	Condition	Test Decision
Control Class (class does not use M-LMS)	0,000	< 0,05	There is a difference
Experiment class (class using M-LMS)	0,000	< 0,05	There is a difference

Based on the result of t-test of posttest in the table 9, 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 = 82.00> X A2B1 = 71.00).

iii). T*he t-test of third posttest*

From the result of test that were given to the control class and experimental class, it could be identified and analysed as follow:

Table 10. Summary of third posttest of t-test

Learning Outcomes	P_{Value}	Condition	Test Decision
Control Class (class does not use M-LMS)	0,000	< 0,05	There is a difference
Experiment class (class using M-LMS)	0,000	< 0,05	There is a difference

Based on the result of t-test of posttest in the table 10, 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 of learning outcomes between class that used M-LMS (experimental class) and the class that did not use MLMS (control class). From te table 11 it can be concluded that :

Table 11. Summary of Effectiveness Results

No	*Pretest-Posttest*	Class	Learning Outcomes		t-test	
			Pretest	*Posttest*	Result	Explaination
1	First	Experimental	76	80	0,000 < 0,05	Ha accepted
		Control	70	73		
2	Second	Experimental	78	82	0,000 < 0,05	Ha accepted
		Control	69	71		
3	Third	Experimental	80	85	0,000 < 0,05	Ha accepted

Therefore, it can be concluded that the t-test results show a significant difference of learning outcomes between class that used M-LMS (experimental class) and the class that did not use M-LMS (control class). From the table 11 it can be concluded that :

1. The average grade of posttest of class control is 73 while the average grade of posttest of experimental class is 80
2. the average grade of posttest of class control is 71 while the average grade of posttest of experimental class is 82.
3. The average grade of posttest of class control is 73 while the average grade of posttest of experimental class is 85

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

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

The test result of effectiveness of M-LMS usage according to the lecturer's perception can be divided into 2 variables that is independent variable and dependent variable. The independent variable is the user of M-LMS system and the dependent variable is the use of M-LMS as a learning model that is seen from the perception of ease (perceived ease of use) and perception ofusefulness (perceived usefulness/ TAM) users of the new system. To see the effectiveness of the use and ease of M-LMS according to the lecturer's perception, it can be see:

Table 12. The Data on the Effectiveness of mobile Learning management System (M-LMS) according to the Lecturer's perception (Assessment was conducted by 20 Lecturers)

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No	Aspect	Lecturer						
		VA	%	A	%	D	%	AVR
Perseived Ease of Use								
1	M-LMS can be accessed easily from off-campus	10	50	6	30	4	20	4,3
2	M-LMS is easily accessible via Android, HP, and Smart Phone	10	50	8	40	1	5	4,45
3	How to use M-LMS is easy	11	55	9	45	0	0	4,55
4	Menu layout on M-LMS is easy to understand	10	50	8	40	2	10	4,4
5	The facilities / features are easy to use	9	45	6	30	3	15	4,25
6	Ease of use M-LMS facilitate the work / teaching task	5	25	11	55	3	15	4,05
7	Easy uploading material and tasks	8	40	7	35	5	25	4,15
8	Facilitate interaction with fellow students and Lecturers.	11	55	8	40	1	5	4,5
9	M-LMS is more comparable to free LMS Flatform	8	40	9	45	3	15	4,25
Perseived Usefulness (Usability)								
1	Increase effectiveness in work	9	45	10	50	1	5	4,4
2	Minimize information loss	8	40	8	40	2	10	4,25
3	Get the required information	5	25	11	55	3	15	4,05
4	Obtain additional information required	9	45	9	45	2	10	4,35
5	Faster in working tasks	6	30	8	40	6	30	4
6	Easier in doing work tasks	7	35	10	50	2	10	4,25
7	Save time in searching for information about education	7	35	7	35	6	30	4,15
8	Save costs in finding information about education	8	40	8	40	4	20	4,2

From table of questionnaire on the effectiveness of the use of M-LMS, when it seen 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, arround 92% respondents answered is agree which means that this system is easy to use. The structure of menu of MLMS is easy to understood whereas 45% of respondents is agree and 50% is strongly agree. The ease of using M-LMS accelerate the work teaching tasks, 55% of respondents is agree and 25% is strongly agree. The perception of usefulness (benefit) shows that 50% of respondents is agree and 25% is strongly agree that the M-LMS can increase the effectiveness in the work. As many as 40% of respondents is agree and 40% is strongly agree that the use of M-LMS minimizes the loss of information in assigning lecture assignments to the students, obtaining required information, faster and easier in doing tasks. Overall, the answer of respondents is that the M-LMS is very useful as one of 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 learning process as well as improve their achievement. Research findings depict that the students who use M-LMS in learning getting positive impacts on their engagement and achievement compared to the students who did not used it. This is inline with Al-Fahad (2009) [21] which states that the use of mobile devices among students could provide a positive impact in achieving the goal of learning. It can be concluded that mobile learning management system gives a significant positive impacts in improving student engagement and achievement. Therefore, the use of mobile learning in higher education could be maximized in order to achieve the goal of learning. In addition 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 mobile learning management system could improve student's engagement as well as their achievement. As it has been stated by Wingwatkit and Pajaburee (2017) , a learning process by using mobile learning system could improve student activity and understanding in the classroom. This statement is inline with the developed M-LMS, where the learning sytem using M-LMS that have been conducted proves that it could increase students engagement and their achievement.

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