

THE EFFECTIVENESS OF MOBILE BASED LEARNING TECHNOLOGY VERSUS FACE-TO-FACE LEARNING OF ACCOUNTING INFORMATION SYSTEMS

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ABSTRACT

The fast developments of information and communication technology (ICT) today not only have an impact on the world of industry, but also in the world of education. In the world of education, the useage of ICT is expected to improve the performance, especially the performances of students with regard to their academic matters. The need to improve the quality of accounting graduates who have personal skills has long been a concern of accounting education. This study aims, first to provide empirical evidence that mobile learning will improve student performance not only in technical skills but also in personal skills. Second, to prove and test the effectiveness of mobile learning as opposed to face-to-face learning in improving the competence of accountants in accordance with the standards established by the Indonesian Institute of Accountants (IAI) and the national education goals. Method of learning with mobile technology is expected to support the learning process of the present method so as to improve the competence of accountants in terms of technical competency skills, personal skills, business knowledge and extensive expertise. The third objective is to understand the students' motivation in learning. This study is an exploratory research and developed a new mobile learning application of Accounting Information Systems. This study used quasi-experimental research design to test the new application.. Research results of the pre-test and post-test score indicated that mobile based learning technology is more effective than face-to-face learning for additional learning of accounting information systems.

JEL: M49

KEYWORDS: Mobile Learning Applications, Quasi-Experimental Design, Students' Performance

INTRODUCTION

The fast developments of information and communication technology (ICT) today not only have an impact on the world of industry, but also in the world of education (Moore et al., 2011; Behera, 2013; Siragusa et al., 2007). In the world of education, the useage of ICT is expected to improve the performance, especially the performance of students with regard to their academic matters. Basically the development and use of ICT can be grouped into two learning systems, ie the system of e-learning as a form of learning that utilizes electronic devices and digital media and mobile learning (m-learning) as a special form of learning that utilize devices and communication technologies such as mobile phone (smart phone). This new concept will influence the educational learning process transformation from conventional education into digital form.

The need to improve the quality of accounting graduates who have personal skills has long been a concern of accounting education. The American Institute of Certified Public Accountants (AICPA) published a framework of core competencies (Core Competency Framework) that must be possessed by students entering the accounting profession, both in the public sector, industry, government, or other service

business, which was also adopted by the Indonesian Institute of Accountants/IAI (AICPA, 2004, 2010; IAI, 2010). The competency framework supports the concept of continuous learning that starts from the academic environment and continuing (life-long) through professional education and experience. Learning accounting requires more than knowledge transfer which include the active role of accounting students in their learning process. Quality of learning is not something that can be given away by educators, but need to be developed by the students through the process of interaction between students, educators and other students. In addition to developing technical knowledge and skills of accounting, accounting education programs must be designed to be able to develop computer competency and information systems, communication, interpersonal, intellectual, critical thinking, problem solving, integrity, and othegeneric (soft) skills (Holcomb and Michaelsen, 1996; Boyce, 1999; Behera, 2013). Accounting education is also expected to develop a level of expertise that can be applied in a variety of contexts, including skills that enable students to understand and criticize accounting information and its role in economic and social, as well as the role of accountants in creating and re-creating the social reality (Hines, 1988). Supporting learning methods such as mobile learning appears to be an ideal solution to improve the quality of accounting graduates.

One of the benefits of mobile learning is the life-long learning as indicate on the Core Competency Framework (from AICPA) which supports the concept of continuous learning that starts from the academic environment and continuing (life-long) through professional education and experience. Therefore, this study aims to provide empirical evidence that the approach to learning with mobile learning will improve student performance not only in technical skills but also in personal skills. In addition, by adopting mobile learning technology in accounting education, accounting students not only understand the importance of personal skills in the accounting profession, but they also learn to accept and use ICT as part of the accounting profession. In other words, mobile learning that support conventional learning will drive the achievement of the overall competence of accountants: the technical competence, personal competence and a broad business perspective competency.

This research also aims to prove and test the effectiveness of mobile learning as opposed to face-to-face learning in improving the competence of accountants in accordance with the standard established by the Indonesian Institute of Accountants (IAI) and the national education goals. Method of learning with mobile technology is expected to support the learning process of the present method so as to improve the competence of accountants in terms of technical competency skills, personal skills, business knowledge and extensive expertise. Important issue in accounting education is how to have a qualified accounting graduates competencies in line with the expectations and the needs of the community. Indonesian Institute of Accountants (IAI) has adopted the core competencies of accountants based Core Competency Framework issued by the AICPA.

IAI also stated that although the curriculum/syllabus of undergraduate accounting education and Accountants Professional Education (PPA) in terms of skills, values, ethics and professional attitude is subjected to International Education Standard (IES) no. 3 - professionals' contents and skills, no. 4 - professional values, ethics, and attitudes, but still need to balance the percentage of the knowledge, skills, values, ethics and professional attitude, and assessment of methods and techniques of teaching (IAI, 2010). This study is important for several reasons: first, this study tried to carry out a review of the methods and techniques of teaching by providing a solution that is more sophisticated learning methods in accordance with the advancement of technology, the mobile technology-based learning methods. Second, although mobile technology has developed very rapidly, up to date positive impact of mobile learning is still questionable, considering there are positive and negative impacts of the emerging mobile technologies. Finally, the application of mobile learning in accounting education and its impact to date, to the author's knowledge has not been done. The rest of this paper will be organized as follows: the second section of this paper is the literature review. The third section outlines the research methods and the forth section describes research results. Finally, conclusion is set in the last section.

LITERATURE REVIEW

Theories in Mobile-Learning

Integration of technology based learning like M-Learning in the learning process is supported by several theories. The first theory is socio-constructivist theory. Swan (2005) indicated that socio-constructivist theory basically constructed from cognitive-constructivist theory and social-cognitive theory. Constructivists believe that reality is constructed by the human mind when interacting with the world where we live physically, socially, and mentally. We try to understand the experience by constructing and adjusting the internal structure of knowledge that is collected and organized in our mind as a perception and is reflected in the reality. Socio-constructivist learning theory suggests that learning in the minds of individuals and is an active process of forming mental interacts with the environment or emerging from social interaction (Duffy and Jonassen, 1992). Learning is essentially a social activity, and that reality is constructed through communication, collaborative activities and interactions with others. This indicates that students naturally organize and construct their knowledge and computer technology is a media that support the interaction process. Thus, constructivists believe that the computer has a unique capacity to represent abstract ideas into more concrete form.

From the point of view of constructivist, learning becomes more individualized and increased knowledge of individuals will center on the learner (learner-centered). Therefore, the individual will interact with other individuals (collaborative) and perform continuous learning (life-long), so that the technology can be used as a means of learning the (Swan 2005). The second theory is situated learning theory which suggested that learning must be conducted in the context of actual environment. Digital learning technology can be used not only to represent the contexts but also learning content (Brown et al., 1989). Theorists of learning-situations (situated learning), argues that learning is a function of activity, context and culture in which the learning takes place, so it can not be separated from the support of community participation. The important concept in this theory is the existence of a statement of legitimacy surrounding them. That is, proficiency in the knowledge and skills can be achieved gradually by the plunge in a community of practice. In the context of education, students (cognitive apprenticeship) in the class working on a problem with the help of a friend or someone more expert, like the professor or instructor (knowledge building communities), where students collaborate and learn from the self and community environment gradually (Swan, 2005).

The third theory is Authentic Learning Theory. This theory stated that the development of multimedia technology capabilities able to deliver learning products that facilitate communication and division (sharing) of knowledge so that learners can use it to reflect and construct further knowledge (Herrington dan Oliver, 2000). In developing learning environments in higher education, the constructs used in authentic situated learning theory is derived from learning theory, which can be defined as the context of task and role of participants (users). Task context is created by making a realistic and authentic problem. Realistic and authentic problems are generally complex and difficult to be defined so that depth analysis from various perspectives, collaboration and reflection of participants are needed (Herrington dan Oliver, 2000). Such characteristics exist in ICT including mobile technology. This means that ICT with mobile technologies can be used to learn by creating problems that occur in the real world (realistic and authentic world). Based on these theories, the learning can be done with ICT-based learning media. ICT-based learning can be grouped into two learning systems, namely the e-learning as a form of learning that utilize electronic devices and digital media systems, and mobile learning (m-learning) as a special form of learning that utilize devices and mobile communications technology. These two concepts of learning bring the transformation process from conventional education into digital form, both in content and system.

Mobile-Learning Development

The education system has been and until now mostly done by traditional face-to-face between educators and students in one classroom. The development of ICT has an important role in changing education method. Teaching and learning processes which was originally dominated by the role of the teacher - the area of teacher, and then the process started much dominated by the role of the teacher and books - the area of teacher and book. Furthermore, this role began to shift with the dominant role of teachers, books, and technology – the area of teacher, books, and technology (Soekartawi, 2003; Haythronthwaite et al., 2011; Behera, 2013). Thus there is a shift in learning paradigm from conventional learning to sophisticated learning with digital technologies such as mobile learning. Research by Motiwalla (2007) using experiment study of wireless learning proved that wireless technology can be adopted in learning process. In the world there are more than 5 billion people who bring a very powerful tool in their pocket or bag that is mobile device. Of these people, 500 million people use the internet in 2009. The amount will be doubled within five years in which mobile technology replaces the Personal Computer (PC) as a means to get into the web (Cumavo, 2011). In Indonesia alone, there are 68 million mobile users at the end of 2006, 94.7 million in 2007, and this number will increase to 133 million by 2010. In other words, nearly half the Indonesian population (about 250 million people) will be mobile users (Bahar, 2009).

Indonesia is the world's three biggest users after China and India. Guild Research results regarding the adoption of mobile learning in the organization showed that in the world of education 14.5% had used mobile learning, 10.3% started to build a business case based mobile learning, 47.6% began researching how other organizations use mobile learning, and 22 , 1% do not have any plans with mobile learning. Based on these data, although there was an extraordinary development in mobile learning, but research on mobile learning in accounting education in Indonesia is scarce or even not yet done. Research on learning using information and communication technology (ICT) has been conducted by researchers whose focus is on learning or electronic learning methods are more commonly known as e-learning (Suryaningrum et al., 2009). The research results prove that despite the ease of use of e-learning, but until now the use of e-learning in accounting education in Indonesia is not developed as expected.

In accordance with the development of ICT, learning models shift towards the use of mobile technology that can be accessed anywhere and anytime. Ramli (2011), a senior adviser at the Ministry of Communication and Information of the Republic of Indonesia, said that based on market research in 2010 in the Indonesian cellular telecommunications penetration (full mobility) of 84.5% (\pm 203 million), much larger than the penetration of fixed wireless (limited mobility) which only amounted to 13.3% (\pm 8.3 million), and the remaining 9.3% for fixed wirelines and broadband penetration. Ramli further revealed that in the field of education, the government plans to networking with relation (link) to 40 million students. The factors driving the expanding opportunities of the use or application of mobile learning as a new trend in the study are the level of development of mobile devices is very high, the level of use is relatively easy, and the price of the device is more affordable around \$ 100, compared to personal computers around \$ 500 (Ramli, 2011). This has formed a new learning paradigm that can be done anywhere (where ever) and anytime (when ever).

Historically, electronic learning objects, were designed and developed specifically for playback on unique devices, e.g. videotapes, cassette tapes, CDs, television, personal computers, etc. Accessing courseware specifically developed for these electronic devices resulted in a tethered learning approach, restricting the ability of mobile students to take courses. M-Learning, as a subset of D- and E-Learning, was designed to overcome such limitations (Idrus and Ismail, 2010; Moore et al., 2011). M-Learning 1) provides the ability to create homogenous learning objects for heterogeneous mobile devices, and 2) does so by utilizing wireless connectivity. This approach benefits a growing audience of post-secondary institution and workforce learners, e.g. those in hard to reach, isolated locations, away from their home or office, or in FTF environments where a need to augment the classroom experience exists. The advent of M-Learning created

an environment of anywhere, anytime learning (Keegan, 2005; Low and O'Connell, 2007; Moore et al., 2011). Chocrane (2011) indicated that M-Learning bridges pedagogically designed learning contexts, enables learner generated contexts, and content, while providing personalization and ubiquitous social connectedness. This M-Learning practice was adopted by universities and firms that wished to reach a diverse audience of learners— many of whom were mobile with restricted access to the devices that traditionally made D- and E-Learning possible.

DATA AND METHODOLOGY

To find out how important the material content in the curriculum/syllabus is taught to accounting students, a preliminary interviews were conducted with several professors and students of accounting at the Universitas Pembangunan Nasional "Veteran" Jawa Timur, particularly on the learning materials of Accounting Information Systems (AIS). Preliminary results of this interview suggest that learning AIS especially with regard to capabilities in the areas of technology and information systems are still very weak. There are two reasons why it happened. First, accounting educators are to focus on the material that will improve practice skill competency (or technical skills) with the hope of accounting graduates to be an expert accountant in applying accounting practices. Second is the limited time in learning with face-to-face teaching methods in the classroom. In accordance with the system of semester credit, accounting courses, which generally have 3 credits given face-to-face teaching time in the classroom (face-to-face) about 2.5 hours (50 minutes x 3 credits = 150 minutes). Face-to-face time in the classroom is generally focused on learning technical skills that do not allow providing or discussing matters relating to ethics, behavior, or technology as learning to improve personal skills. Supporting learning methods such as mobile learning appears to be an ideal solution to solve that problem.

This study is an exploratory research program to develop a mobile learning application of Accounting Information Systems (AIS). Once the AIS mobile learning application is completed, tests on the application made by using the quasi-experimental research design. There are two things that will be measured: 1) student learning outcomes in the domain of knowledge (cognitive) knowledge of AIS. Knowledge was measured using MCQs (Multiple Choice Question) conducted in pre-test and post-test. 2) Students' attitudes and motivation were measured after students attend one lecture or teaching methods by using a mobile learning. MSLQ (Motivated Strategies for Learning Questionnaire) developed by the National Center for Research University of Michigan to improve postsecondary teaching and learning (Pintrich et al., 1991; Garcia and Pintrich, 1995; Duncan and McKeachie, 2005) is used in this research.

Research subjects are fifty two students of the Faculty of Economics majoring in Accounting who has passed the AIS courses. Students are grouped into two randomized groups. Each group will follow the learning process of AIS with a certain topic of data warehousing with different methods: 1) face-to-face classes are held at the Laboratory of accounting and 2) mobile learning that can be done by students anytime and anywhere. Respondent responses are 100% and all 52 datas can be used for further examination. The quasi-experiment was started in February 2014 (pre-test) and finished in May 2014 (post-test). The pilot study of mobile technology-based learning applications is done at the user level (accounting student who has completed an AIS course). Design is quasi-experimental control group pre-test and post-test non-equivalent (non-equivalent pre-test and post-test control group design) testing pre-post test, attitude assessment, and student motivation to use mobile learning.a). Pre-post test was conducted to measure the impact of behavioral changes in students after the students utilize mobile learning application program with their cell phone. Pre-test conducted before students take advantage of mobile learning applications program, which aims to measure the ability of students before the beginning of the use of technology-based learning mobile applications. Post-test was performed after an application program utilize in the student learning. Students were given for 6 days to try and take advantage of learning applications. Test post-test is intended to measure the ability of students after using the mobile technology-based learning application. b).

Assessment of attitude and motivation of accounting students is done to seek information from students after the students get a chance to try and make use of mobile technology-based learning application.

RESEARCH RESULTS

Numbers of students who are willing to follow the pre-test are as many as 52 students. Pre-test questions are multiple choice questions with topic of data warehouse that consists of 20 questions randomly selected from the 30 available questions. In the pre-test, the students were grouped into 4 groups to distinguish given multiple choice questions. This is done so that each student can not imitate each other answers. The average pre-test score of students is 53.94 or 54 (fifty-four). The pre-test scores will then be compared with the post-test scores, the value after the student got to the topic of AIS data warehouse learning. Comparison of pre-test and post-test was conducted using paired sample t-test. At the post-test activities, students were also asked to complete a questionnaire about the attitude and motivation of the use of mobile technology in learning. Data tabulation and analysis was conducted in May 2014. Data qualified test was conducted to prove that the instruments and data are suitable for further analysis. The reliability test showed alpha of 0.88 more than 0.60 which indicated that the data was reliable. Validity test Ujishowed that Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO-MSA) score was 65.3% more than 50% which indicated that the data was valid for further analysis. The analysis was conducted to provide: 1) whether the additional learning using mobile learning is effective in improving students' knowledge and ability and 2) whether there is motivation difference in learning using mobile-learning between the two groups of mobile-learning (ML) and face-to-face (FTF).

Table 1: Normality Test

No	Item	Sig.	Conclusion
1	Pre-test Score	0,229*	Normal
2	Post-test Score	0,200*	Normal
3	Learning Motivation	0,987*	Normal

*Significance at the 5 percent This table shows the result of normality data test. The significance values show more than 0.05 which indicates that all data are normal.

Table 2: Pre-Test and Post-Test Comparison of AIS Score

Group	N	AIS Score (Average)	
		Pre-Test Score	Post-Test
Face-to-Face (FTF)	26	51.54	55.65
Mobile-Learning (ML)	26	56.35	71.73
Total (average)	52	53.94	63.69

This table shows on average the AIS score before (pre-test) and after (post-test) the additional learning both of face-to-face and mobile learning

Comparison of Accounting Information System (AIS) score before and after the additional learning in Table 2. Table 2 showed that on average AIS score for both groups are increased. The average AIS score for FTF group increase from 51.54 to 55.65 while ML group increase from 56.35 to 71.73.

Table 3: Paired T-Test on AIS Score

Group	Mean	Std.Dev	Std.Error	T	Df	Sig.
FTF	4.115	3,374	0,662	6,219	25	0,000*
ML	15.385	11,363	2,229	6,903	25	0,000*
Total	9.750	10,062	1,395	6,987	25	0,000*

*Significance at the 5 percent This table shows the result of paired t-test on AIS score after additional learning. The significance values show less than 0.05 which indicates that there is difference between students who received additional learning with face-to-face to students with mobile learning.

On total, the AIS score increase from 53.94 to 63.69. Paired t-test was used to examine whether these scores are significantly different as shown in table 3.

The results using paired t-test proved that there are significant differences between students who received learning materials of accounting information systems with face-to-face classes and mobile learning. Learning with mobile learning indicated the average change in the value of knowledge at 15.385, while the face-to-face learning of only 4.115. This implies that additional learning with mobile learning is more effective than the face-to-face learning.

Table 4: One-Way Anova Post-Test Score Dependent Variable: Post-Test Score

Item	Sum of Square	Df	Mean Square	F	Sig.
Between Group	3360.077	1	3360.077	30.530	0.000*
Within Group	5503.000	50	110.060		
Total	8863.077	51			

*Significance at the 5 percent This table shows the result of one-way ANOVA on post-test score. The significance values show less than 0.05 which indicates that there is difference between students who received additional learning with face-to-face to students with mobile learning.

Testing with one-way ANOVA (Table 4) shows the F value of 30.530 with significance value of 0.000. The significance value less than 0.05 so it can be concluded that the post-test score between groups (face-to-face and mobile learning group) are significantly different. It is proved that additional learning materials using mobile learning is more effective than face-to-face learning. Therefore, the material of AIS that could not be thought in face-to-face classroom activities can be added using mobile learning.

Table 5: One-Way ANOVA of Learning Motivation Dependent Variable: Learning Motivation

Item	Sum of Square	Df	Mean Square	F	Sig.
Between Group	0.050	1	0.050	0.165	0.686*
Within Group	15.109	50	0.302		
Total	15.159	51			

*Not-Significance at the 5, 10, 25 percent This table shows the result of one-way ANOVA on learning motivation. The significance value shows more than 0.05 which indicates that there is no difference of learning motivation between students who received additional learning with face-to-face to students with mobile learning.

Testing with one-way ANOVA (Table 5) shows the F value of 0.165 with significance value of 0.686. This value is greater than 0.05 so it can be concluded that the learning motivation between groups (face-to-face and mobile learning group) did not differ significantly. This proves that students are motivated to learn similarly despite different method in learning materials. Because of the same motivation to learn, it is suggested that the learning material is added with mobile learning if it is not enough time to explain all of the material in the syllabus on face-to-face classroom activities.

CONCLUSION

This study aims to provide empirical evidence that mobile learning will improve student performance and to prove and test the effectiveness of mobile learning as opposed to face-to-face learning and to understand the students' motivation in learning. This study is an exploratory research and developed a new mobile learning application of Accounting Information Systems. This study used quasi-experimental research design to test the new application. The test results prove that the additional learning with mobile learning is more effective than face-to-face learning. The advantage of mobile learning is no limitation of space and time, making students can learn anywhere and anytime as required. At least four limitations should be noted in this study. First, this study using experimental design that focused more in internal validity than external

validity. Second, students' performance may be different since individual participant provided the empirical data, possible biases or preferences (e.g. learning styles, students' GPA, social preferences, etc) may exist due to different personal experiences, family, or educational background. Third, since this study is an exploratory research, it didn't control for other variables that may influence the students' performance. Finally, this study use paired t-test and ANOVA to analyze the different of students' performance and learning motivaton between face-to-face and mobile learning that may have some limitations. Future research may conduct the same study with larger participants to expand the external validity, use a control variable as a moderating variable (such as GPA, learning styles), and use other analysis like two-ways ANOVA or multivariate analysis.

ACKNOWLEDGEMENT

This research is founded by the Directorate General of Higher Education, Ministry of Education Republic of Indonesia (DIKTI) with SKIM Competition Grant (Hibah Bersaing) for the implementation year of 2014.

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