Development of Collaborative Blended Learning Activity on Mobile Learning to Enhance Undergraduate Students' Collaboration Skills

การพัฒนากิจกรรมการเรียนรู้ร่วมกันบนเอ็มเลิร์นนิงแบบผสมผสานเพื่อส่งเสริม ทักษะการทำงานร่วมกันของนักศึกษาระดับปริญญาบัณฑิต

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Abstract

The study was to development of collaborative blended learning activity on mobile learning to enhance undergraduate students' collaboration skills. The study was undertaken in two phases: (1) development of collaborative blended learning activity on mobile learning, and (2) study of the result of collaborative blended learning activity on mobile learning. The samples of the study were 35 undergraduate students enrolling for Infomation Technology for Education course in Silpakorn University. Percentage, arithmetic mean, standard deviation, and t-test were used to analyze the data.

The findings of the study were as follows:

1. The developed collaborative blended learning activity on mobile learning consisted of two components included; activity components consisted of 6 element: (1) students (2) teacher (3) mobile device (4) content (5) mobile learning management system and (6) assessment. Learning process consisted of preparation before the instruction including three steps: (1) orientation (2) pre-test and (3) students grouping. The learning with collaborative blended learning activity including five steps: (1) work defining (2) work planning (3) work operating (4) work presentation and (5) discussion and summarize. The assessment including two steps: (1) post-test and (2) collaboration skills evaluation.

2. The students' collaboration skills appeared to be at a highest level after being exposed to the developed learning activity.

3. The students who had been learning based on the developed collaborative blended learning activity on mobile learning had higher learning achievement at statistical significance of .01.

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4. The students had a highest level of satisfaction toward the developed collaborative blended learning activity on mobile learning.

Keywords: 1. Collaborative Learning 2. Mobile Learning 3. Blended Learning

Introduction

The Thailand Information and Communication Technology (ICT) Policy Framework (2011-2020) or ICT2020 has guided the intelligent development of Thailand, focusing on knowledge-based economic and social activities. The "Smart Thailand 2020" vision states that "ICT is a key driving force in leading Thai people towards knowledge and wisdom and leading society towards equality and sustainable economy". It will see a drive towards "smart learning" which is aiming for enhancing knowledge and understanding about using ICT for people at all levels, by offering on-going skills training in using and applying ICT and developing ICT content for learning aimed at education personnel (Ministry of Digital Economy and Society, 2011).

Nowadays, Information and Communication Technology is a necessity for developing an education program. Since the internet, as an effective communication technology is invented, it is used for increasing communicative channels, research. Afterward, the communication devices such as PDA, Tablet PC have been developed to be more effective and more rapid in data processing and have high capacity for communication. As these devices are connected to the internet and portable, it is usually applied for an instructional process as known as mobile learning.

Mobile learning, also known as mobile learning is an instructional system through wireless tools. It is as an innovation that allows students to learn anytime and anywhere they desire by employing mobile devices that connects to the wireless network or mobile network (Saingthong, 2014). Mobile learning consists of 4 essential features that are 1) mobility: Students are able to learn anytime and anywhere 2) collaborative: Students work together on mobile devices and improve cooperation skills, establish interpersonal contact as well as share knowledge and experiences mutually. 3) connectivity: It is possible to connect mobile devices to database and instructor can join students through wireless communication. 4) personal learning: students can learn as they desire according to their personal instruction model. (Klopfer et al., 2002; Fezile and Nadire., 2011; Radovan, 2015; Umera et al., 2013)

Because of mobile learning, students enjoy the freedom of choosing their appropriated learning and acknowledging methods without having any restrictions on time and place.In additions, mobile learning raises learning possibility and increases student's motivation as well as creates concrete learning environment. Therefore, the instructor-centered learning is replaced by students -centered learning according to which instructor can interact directly with students (Greene, 2006). It can be said that mobile learning employs technology for instructional management in order to enhance students' quality and efficiency. According to Karthikeyan, Uma, and Pudumalar (2015) who applied mobile learning in classes at TCE in India in order to improve learning skills of different students s, it is obvious that Wi-Fi devices can increase learning efficiency in each course. Additionally, Patrick et al., (2015) undertakes the study on learning management system through a mobile application. According to this study, the group created and developed learning management system that can be used through mobile devices.

However, the single use of mobile learning in learning-teaching management imposes the restriction on the interaction between teacher and students. Some learning-teaching practices requires the presence of teacher and students as well as face to face interaction such as presentation in front of a classroom, seminar as well as roundtable discussion. For this reason, blended learning is necessary in learning-teaching management. Blended learning is an education program that combines mobile learning or online digital learning with traditional classroom methods. It is used upon learning technique that is appropriated to learning activities (Thammetha, 2013)

According to blended learning, all forms of instructional technology are applied in a traditional classroom that requires the presence of teacher and students. Blending learning associates face-to-face learning and online learning together by emphasizing a distinctive point in order to close the gap in the classroom (Driscoll, 2002). Therefore, the researcher uses online learning to combine with traditional classroom method in order to help to progress in the most effective and efficient manner as well as lift the restriction on mobile learning and face-to-face learning method. According to Mohammed, S. and Mohamed, A. (2015), the mobile phone is used in blended learning and online learning and students gets access independently to the content upon their readiness. The lessons are uploaded in application and students can download. The students are satisfied with this new method as they can employ mobile devices as learning tools.

At the present, Partnership for 21st Century Skills develops a vision enhancing the students' success in new world economy. This vision could be considered as the commencement of the development of 21st Century Skills for Thailand. The 21st Century Skills comprises important skills: learning skill and innovation that prepare the students before entering into professional life which is gradually becoming more complicated. The communication and collaboration skill are therefore indispensable for students.

According to 21st Century Skills Development, the collaboration is important. This idea is closely related to Thailand Qualifications Framework which includes 5 aspects: virtue-morality, knowledge, cognitive skills, interpersonal skills and responsibilities as well as numerical analysis, communication and information technology skills. Collaboration skills is one of the key performance indicators in interpersonal skills and responsibilities. The students should be able to work in a team, assert personal leadership and have self-responsibility to create social responsibility as well as be able to plan and responsible for their learning goal. (Office of the Higher Education Commission, 2009)

In order to prepare students achieving success through effective and collaborative teamwork, it is necessary to improve their teamwork skills. It is also important to consider the responsibility in teamwork and admire the value of other's work. By sharing common interests, collaborative learning encourages the students to do a project and present the result in team. Moreover, collaborative learning allows students to demonstrate knowledge together by using learning technology. Through the presentation, students are able to develop an internal relationship (Dissakul, 2000).

Moreover, collaborative learning helps learner to increase working efficiency by linking their personal pieces of knowledge, then synthesizing it in order to develop new meaning or solution (Gerlach, 1994; Koschman, 1997). Therefore, students can understand different point of views and gains deep and wide understanding of the result. The students are freely to demonstrate their opinion as well as develop new knowledge through group working. Because of the quality of working environment, students understand and gets along well with other members in group. Therefore, students can constitute a better achievement and develop internal inspiration. (Golder and Huberman, 2006)

Collaborative learning can be implemented with mobile learning in order to increase anytime and anywhere learning through the collaborative learning process. The students can use application in mobile learning in order to study and participate in activities. As stated Yung-Ting Chuang (2015) who did research on "A Smartphone-Supported Collaborative Learning System", collaborative learning enhances the effectiveness of individual learning, encourage

students to work in team. Moreover, students are more satisfied towards classroom and can develop advanced thinking and teamwork and interpersonal skills.

As mentioned above, information and communications technology are indispensable for the development of learning activities as students can acquire collaboration skills. For this reason, I am interested in conducting the study on the development of collaborative blended learning activities on mobile learning in order to improve collaboration skills. This collaborative activity is organized by using blended mobile learning in order to facilitate students learning and reduce restriction on place and time. In order to enhance the effectiveness of learning activities, it is based collaborative learning as well as making a presentation by mutual understanding.

Research Purposes

1) To develop collaborative blended learning activity on mobile learning to enhance undergraduate students' collaboration skills.

2) To study students' collaboration skills after participating in collaborative blended learning activity on mobile learning.

3) To study students' achievement on learning by collaborative blended learning activity on mobile learning.

4) To study students' satisfaction on collaborative blended learning activity on mobile learning.

Research Scope

1) Population: Undergraduate students, Faculty of Education, Silpakorn University, Sanam Chandra Palace Campus who study in the second semester of 2017.

2) Sample: The samples of the research were 35 undergraduate students, Faculty of Education, Silpakorn University, Sanam Chandra Palace Campus, selected by simple random sampling technique, who has been enrolled in Information System for Education course in the second semester of 2017.

3) Variable of Research

Independent variable: Collaborative blended learning activities on mobile learning.

Dependent variable: Collaboration skills, learning achievement, and students' satisfaction.

Research Methodology

The research on "The development of collaborative blended learning activity on mobile learning to enhance undergraduate students' collaboration skills." use research methodology as follows:

1) The development of collaborative blended learning activity on mobile learning to enhance undergraduate students' collaboration skills

1.1) An analysis for determining the particularity of learning activities including analysis, students, the purpose of instruction as well as content analysis.

1.2) Designing collaborative blended learning activity on mobile learning.

1.3) Developing collaborative blended learning activity on mobile learning as well as improving learning support materials.

1.4) Evaluating collaborative blended learning activity on mobile learning by 5 purposive choosing experts specialized in instructional design, mobile learning, information technology and collaboration skills. The activities will be improved according to their suggestions.

1.5) Developing and evaluating the quality of experimenting materials such as achievement test (reliability = 0.73), collaboration skills assessment form (IOC ranged between 0.67 – 1.00) and the satisfaction survey (IOC ranged between 0.67 – 1.00).

1.6) Developing collaborative mobile learning management system. The researcher creates the program according to Systems Development Life Cycle: SDLC that includes making system requirement analysis, analyzing and designing the system, developing the system, testing the system as well as implementing the system.
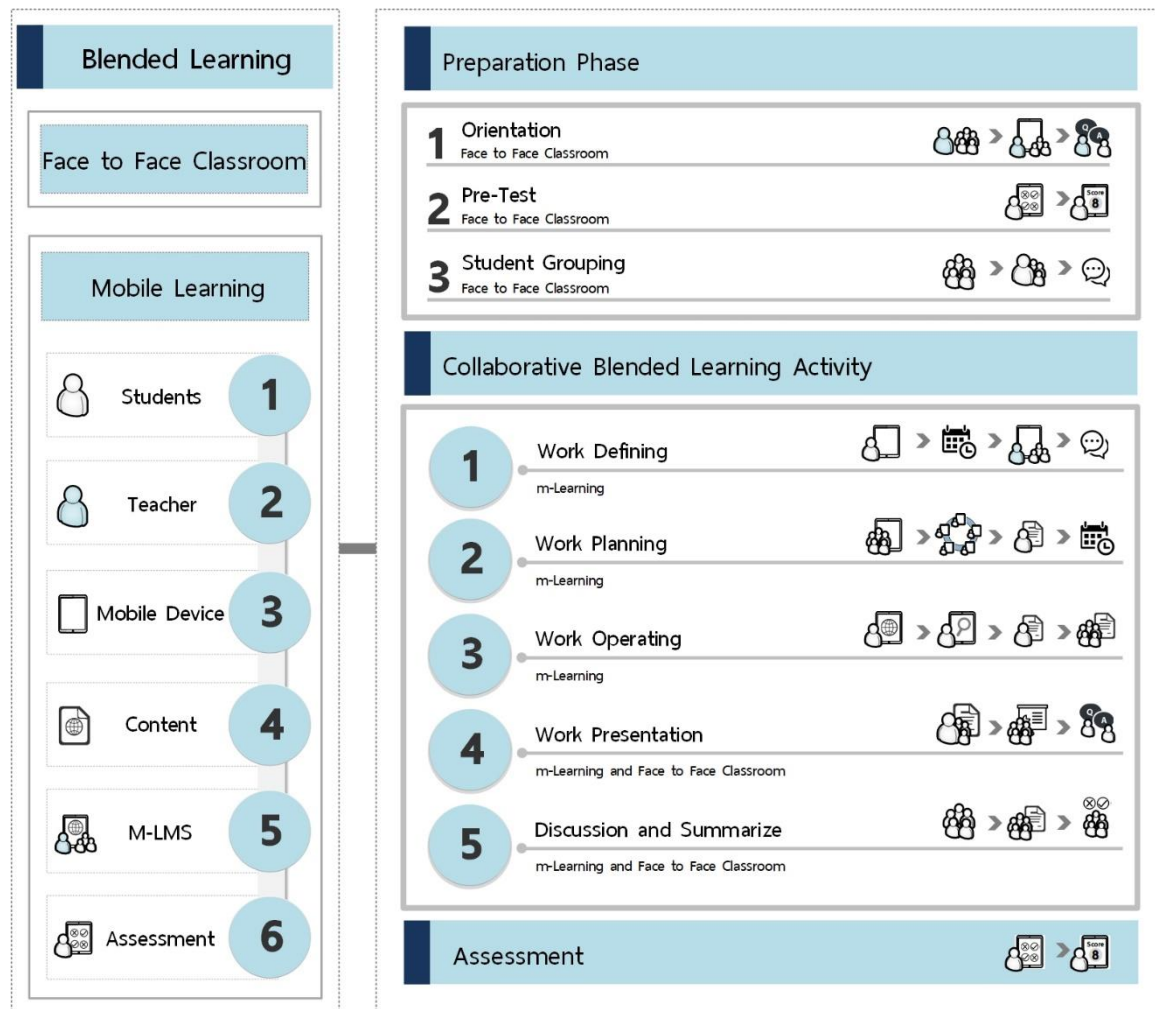
2) Study of the result of collaborative blended learning activity on mobile learning to enhance undergraduate students' collaboration skills

2.1) Planning before doing an experiment, creating an environment for mobile learning by providing computer notebook, learning management system, Internet connection as well as related programs.

2.2) Doing the experiment by conducting the collaborative blended learning activity on mobile learning to enhance collaboration skills.

Results

1) Collaborative blended learning activity on mobile learning to enhance undergraduate students' collaboration skills 2 main aspects as follows:

Picture 1 : Collaborative blended learning activity on mobile learning

1.1) The factor of collaborative blended learning activity on mobile learning: the collaborative learning activities on blended mobile learning not only combined activities in the traditional classroom and mobile learning together, but it also creates synchronous and asynchronous discussions. Mobile learning instructional process comprises of 6 elements as follow:

1.1.1) Students: students are the main factor in mobile learning as students attend to the classroom and do activities assigned by a teacher. Learning activities and learning content are addressed directly to students and they have to follow the activities in order to achieve instructional objectives.

1.1.2) Teacher: teacher plays an important role in carrying out instructional process, designing learning activities and facilitating students learning, scoping the content as well as evaluating students' achievement. The teacher must monitor continuously the students' learning process in order to achieved learning goal.

1.1.3) Mobile Device: students use a mobile device to access to content, the assignment that instructor had prepared. This mobile device should be abler to connect to Wi-Fi Internet in order to create anytime and anywhere learning.

1.1.4) Content: By adopting m-Leaning in the instructional process, the teacher is responsible for preparing the content for students. It is also possible that the teacher assigns students to search information from learning sources on the internet which can be used in class or working assignment.

1.1.5) Mobile Learning Management System: M-LMS helps to manage learning activities and do an assessment in order to achieve learning goal.

1.1.6) Assessment: mobile learning allows evaluating students and reporting learning outcome rapidly. All information can be stored in the database. Students can do learning measurement and evaluation from a mobile device.

1.2) Instructional process according to collaborative blended learning activity on mobile learning has 3 steps as follows: (1) Preparation phrase (2) Applying collaborative blended learning activity on mobile learning phrase and (3) Evaluation phrase.

1.2.1) Preparation phrase consists of 3 steps that are orientation, pre-test and committee work session

Orientation: an orientation session is designed for providing an understanding of learning objectives and goal, collaborative learning activities, methodology and learning activities, assessment as well as the use of CM-LMS system.

Pre-test: pretest is designed for inviting students to do pre-test on collaborative learning management system in mobile learning in order to evaluate the knowledge background of students before giving instruction.

Student Grouping: students form a group of 4-5 people and attribute a responsibility. The member selects group leader and takes role and responsibility for each member.

1.2.2) Collaborative blended learning activity on mobile learning follows process as following:

Work Defining: teacher introduces work assignment on mobile device using CM-LMS system. Students try to understand the assignment.

Work Planning: the member organizes a meeting in order to plan work schedule, attribute responsibility for each member, define the scope of work as well as how to operate. Each student must express opinion, make a discussion, ask questions and give suggestion as well as exchange idea in order to build group engagement plan through collaborative online documentation tool.

Work Operating: each member is responsible for doing learning assignment distributed by the group. The students access to information being available onCM-LMS system or visit learning resources provided by a teacher. The students must share the information with member in the group by using collaborative online documentation tool in order to create group work.

Work Presentation: group leader submits the work on CM-LMS system. After that, the members give a presentation, so that teacher and classmate ask a question or give a suggestion.

Discussion and Summarize: the member discusses the result of the study from beginning to the end if it goes as planned. The unclear issues should be explained on this process between teacher and students or each member of the group. Afterward, teacher and students conclude the result of study and save in online documentation tool.

1.2.3) Assessment process follows 2 steps: post-test and collaboration skills evaluation
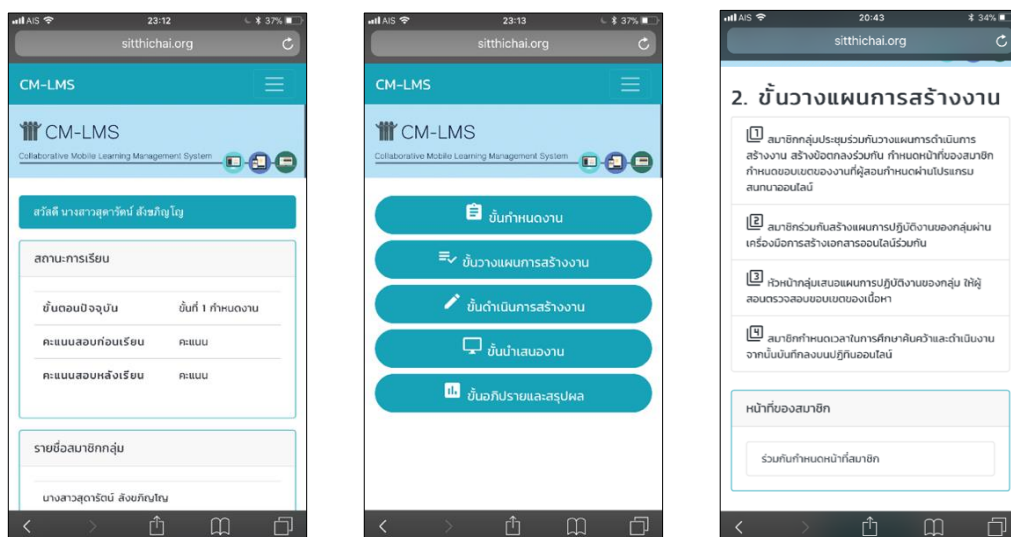
Post-test: post-test process is aiming for evaluating learning achievement of learner after instruction.

Collaboration skills evaluation: collaboration skills evaluation process is aiming for evaluating collaboration skills of learning after doing activities. It is an authentic assessment which uses evaluative criteria comprising of 4 levels (Rubric). This includes teacher assessment, self-assessment, and group assessment. The assessment form includes 5 aspects that are motivation, equality, common goals, responsibility and common decision as well as resource sharing.
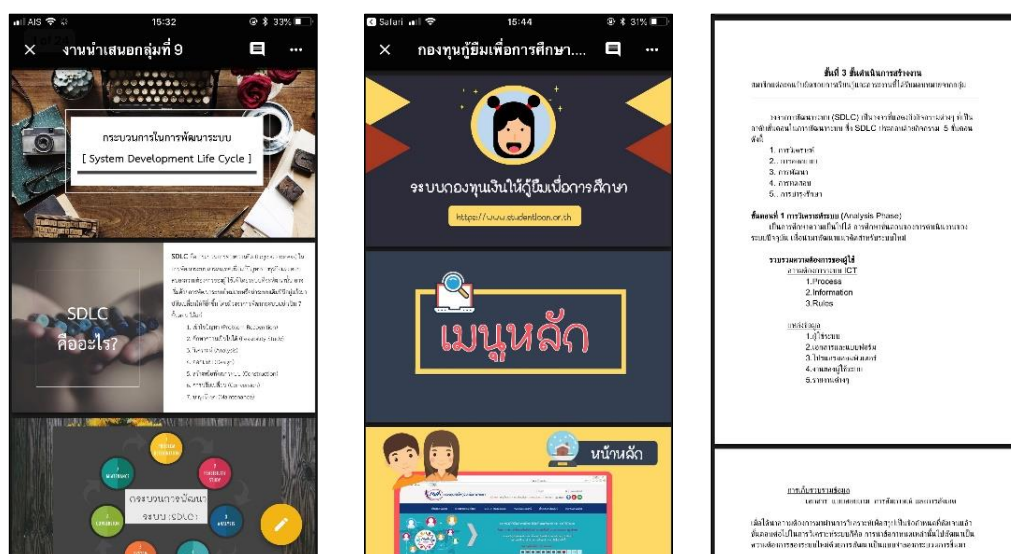
Afterward, the researcher submits the details of collaborative learning activities to experts in order to evaluate the quality. As approved by experts, collaborative blended learning activity on mobile learning to enhance collaboration skills has highest-level quality at ($\overline{\mathbf{X}}$ = 4.68, S.D.= 0.49.) When considered in each aspect, the instructional process has the best quality ($\overline{\mathbf{X}}$ = 4.72, S.D.= 0.50) follows by activity components and the appropriation of usage.

2) Collaborative Mobile Learning Management System (CM-LMS)

Researcher has developed CM-LMS by using HTML PHP and Java Script as basic of program development. Moreover, the researcher uses website development network such as Bootstrap which is a web user based on HTML5. The website created by Bootstrap operates on various devices. The system operates on the instructional process, content management, learning content plan and assessment as well as processing learning materials. Besides, it is divided in 6 working modules: leaner's management module, collaborative learning module, online learning module, communication module, cooperation module and assessment module as showed in system screen picture 2. The examples of student work showed in picture 3.

Picture 2 : System screen of CM-LMS

Picture 3 : Examples of Student Work

3) Result of using collaborative blended learning activity on mobile learning to enhance undergraduate students' collaboration skills

Researcher experimented developed learning activities and learning system with the samples and found the result as divided into 3 parts as follows:

3.1) The comparison of student's achievement in pre-test and post-test after applying collaborative blended learning activity on mobile learning to enhance collaboration skills

According to this research, the researcher applied collaborative blended learning activity on mobile learning with the sample for 10 weeks and analyses the students' score by comparing pre-test and post-test. The result of students' achievement is showed as following:

Table 2 Comparison of pre-test and post-test achievement after applied the activities

Learning achievement	n	$\overline{\mathbf{X}}$	S.D.	t	p
Pre-test	35	13.74	3.77	-17.27	.00**
Post-test	35	29.46	4.30		

**p < .01

According to table 2 entitled "Comparison of pre-test and post-test achievement after applied collaborative blended learning activity on mobile learning", it is obvious that students' achievement in post-test is higher than pre-test as statistical significance at level 0.1. It can be concluded that collaborative blended learning activity on mobile learning increases students's achievement.

3.2) The assessment result of students' collaborative blended learning activity on mobile learning to enhance collaboration skills is concluded as follows:

Roughly, the result of collaboration skills showed that students possess a high level of collaboration skills ($\overline{\mathbf{X}}$ = 3.32, S.D.= 0.64), When considered the average of collaboration skills in each aspect, it was founded that students' cooperation skills were in high level in every aspect.

3.3) Result of students' satisfaction towards collaborative blended learning activity on mobile learning to enhance collaboration skills

After applying collaborative blended learning activity on mobile learning to enhance collaboration skills, the satisfaction of students towards the activities was at high level ($\overline{\mathbf{X}}$ = 4.61, S.D.= 0.72). When considered in each aspect, it was found that students are satisfied the highest with instructional process ($\overline{\mathbf{X}}$ = 4.62, S.D.=0.66) follows by collaborative

blended learning activity on mobile learning to enhance collaboration skills ($\overline{\mathbf{X}}$ = 4.60, S.D.=0.72)

Conclusion and discussion

The research entitled "The development of Collaborative blended learning activity on mobile learning to enhance undergraduate students' collaboration skills" draw a conclusion in each aspect as follows:

1) Considering activities aspect, collaborative blended learning activity on mobile learning to enhance collaboration skills approved its quality at the highest level due to the fact that mobile learning component such as mobile device, students, teacher, learning content, instructional management, and assessment are an indispensable component for mobile learning. Each component relates to each other. According to quality assessment, mobile device, as the first component, raises a high rate of quality. This result is obviously important as a mobile device is necessary factor for mobile learning because it allows students participating in learning activities. This result is in accordance with Edgar, Ake, and Mathias (2016), who states that mobile device is an important element of mobile learning. Students use the mobile device to access to learning contents and activities assigned by a teacher. Students, as a second component, must follow the instruction and activities advised by teacher. Students are closely related to teacher (3rd component) who prepares the learning content and activities, assessment and facilitates students learning. The relation between students s and teacher is also explained by Fezile and Nadire (2011) and Vladimir et al. (2011) who states that students are the center of learning process. All learning activities and content are addressed directly to students. The teacher is responsible for conducting a class, designing learning activities, facilitating students learning so that students can reach the learning achievement. The learning content, as the fourth component, should be appropriated for mobile learning because it will help students for reaching learning achievement. The content and learning activities on mobile learning should be related. This idea is consisting with Fezile and Nadire (2011) who states that content is important element of complete mobile learning. Content should be decided in consultation with all stakeholder. Learning content must enable students to quickly zone into needed information. Instructional management system, as the fifth component, should be relevant for learning activities on a mobile device. It helps to manage learning activities from the beginning until the end. Therefore, the effective instructional management system allows students continuing learning activities and increasing instructional effectiveness. This idea is the same as Sopeerak (2014) who states that mobile

learning demand software for administrative system and lesson plan preparation (mLMS) that operates from registration, presentation, management, communication, follow up until assessment. The last component is assessment. Through mobile learning, the assessment, as destined for evaluating students' achievement are available on students' mobile device..

Considering the instructional process aspect, collaborative blended learning activity on mobile learning to enhance collaboration skills approved its quality at the highest level due to that fact that the researcher had followed collaborative learning activities. Therefore, student interact well with the other students and exchange idea in order to create a final work assigned by teacher. The blended learning activities between mobile learning and classroom learning allows students using mobile device for participating in lesson and activity. The activities in class encourages face-to-face interaction in order to present and discuss final work in group. The collaborative learning activity encourages students to interact with each other in every process. Begin by "work defining process", it is aiming for giving an understanding on the assignment and objectives of assignment. The "work planning process" invites members in the group to take their role and responsibility and make working plan together. The "work operating process" is addressed for inviting each member has to search information on learning sources and share it in the group. Afterward, students have to complete group work assigned by teacher. The Work presentation process aims for organizing learning activities in a classroom and invites the students to present their work. The "result and discussion process" is addressed for inviting students to discuss the result of study and give the suggestion for future activity. After all, it is obvious that collaborative learning activities can be applied in blended learning and mobile learning. A similar result was reached by Hongmei & Hongxia (2010) who conducted a research on collaborative learning through the Internet and who states that collaborative learning through the internet increases students learning achievement and cooperation skills. The group success is considered as an individual success.

2) The result of student's collaboration skills shows that collaborative blended learning activity on mobile learning to enhance collaboration skills approved its quality at the highest level. The researcher applied collaborative learning activities in an instructional process. Therefore, students work in a team and take role and responsibilities for each member. The member is responsible for group work. The instructional process by collaborative learning through CM-LMS system encourages group work and group management. Students cooperate through mobile device. This method encourages students to discuss and interact with the other according to student's behavior and learning method. Student can learn about

the norm of behavior of member in the group. They accept the behavior of member in the group, make a decision and respect the decision of the other. Moreover, this method encourages social interaction between students. Student can therefore understand the lesson better and develop cooperation skills. This finding is similar to one found in the research of Jason, Zemerly and Hammadi (2011) who states that mobile learning allocates the content for every type of students and encourages anywhere anytime learning as well as encourage cooperation skills in order to live together peacefully. Students can learn according to their interest and has no need to stay in the same place with teacher and the other. Moreover, mobile learning encourages team work and cooperation. The findings are directly in line with previous findings on Fernandez et al. (2009) "Design of collaborative learning through Ubiquitous Learning" which demonstrates that collaborative learning enhances social interaction between learner. Through collaborative learning, students have a better understanding on their lesson and improves their cooperation skills.

Moreover, during instructional process, the researcher uses collaborative learning method to design the class. In work presentation process and result and discussion process, the class is designed as face-to-face instruction. Students and teacher are at the same time and at the same place in order to encourage face-to-face interaction. Students must work face-to-face with the other. This method can underline the interaction between learners outside mobile learning and student can therefore develop collaboration and interaction skills. This idea is also accords with earlier observation of Hulya and Tufan (2017) who did a research on "A Case Study on Mobile-Blended Collaborative Learning in an English as a Foreign Language (EFL) Context" which states that blended face-to-face learning and mobile learning encourages the communication and interaction between learner as well as develop work quality.

3) A comparison result of student's achievement in pre-test and post-test demonstrates that students s who attended to collaborative blended learning activity on mobile learning to enhance collaboration skills constitute better achievement in post-test than pre-test at statistical significance level 0.1. The instructional process according to collaborative learning activities encourages students to create a group work. In order to create a work, it is necessary to study the content of mobile learning management system or other online learning resources in internet by using a mobile device. The students have to interact with members in a group, share the information and can, therefore, gain new knowledge. Moreover, learning through mobile device increase students' learning motivation because students have no restriction on time and place. Either at home or university, students can access to lesson

anywhere that has internet. Therefore, students learn everywhere and are motivated for learning as well as doing group work. This idea is in accordance with Karthikeyan, Uma and Pudumalar (2015) who states that mobile learning is effective to improve knowledge for students of all type as well as increase the effectiveness of instructional process. In addition, it is in accordance with Wongsinudom and Autthawuttikul (2016) who have developed the tutorial application on tablet with peer-to-peer learning affecting learning together. The students' achievement after using the tutorial applications is significantly higher than that of before using.

4) The satisfaction result of post-learning showed that students after attending to collaborative blended learning activity on mobile learning are satisfied with the activity at the highest level. They suggest that the instructional process is practical, and they can access to leaning content and activities independently from mobile learning devices. Moreover, they can work with other in a group and communicates with other in order to exchange ideas and opinion. mobile learning gives more possibility for accessing the learning resources. These findings are consistent with the research of Yung-Ting Chuang (2015) who works on collaborative learning through a mobile device. According to Yung-Ting Chuang, it is founded that collaborative learning enhances the learning effectiveness, encourage cooperation as well as increases student's satisfaction. Besides, Mohammed and Mohamed (2015) supported this idea by arguing in his research "The use of mobile technology on blended tanning and online training" that students are satisfied with blended tanning and online training because implementing mobile device in learning is recent. This finding is consistent with Hulya and Tufan (2017) in her research "A Case Study on Mobile-Blended Collaborative Learning in an English as a Foreign Language (EFL) Context" which states that mobile-blended collaborative learning encourages cooperation between learner and improve work quality as well as increases level of student's satisfaction. In addition, it is in accordance with Sillapapakdee, Jaroenjittakam, Bangthamai and Yodsin (2017) who have developed blended learning using collaborative learning instruction on news writing ability for public relations. The students' opinion with blended learning by using collaborative learning instruction on writing ability is at a good level.

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