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# Constructivist Learning Environment to Enhance Cloud based Collaborative Learning: Product Design and Development Phase

**Khosit JUMEUSLAP & Issara KANJUG***
*Faculty of Education, Khon Kaen University, Thailand*
*issaraka@kku.ac.th

**Abstract:** Collaborative Learning is the important key for constructivism learning because it is clarify knowledge of the learner. If collaborative learning is adapted with cloud technology, the learner would get more ideas. Thus, the objective of this research is to design the learning environment in constructivism learning which supports collaborative learning on cloud technology. This research methodology are synthesis designing framework, learning environment design, and pilot study. The result of the study was found that the design of learning environment based on constructivism with cloud technology consist of 1) problem situation 2) resource center 3) collaborative learning center 4) scaffolding 5) coaching. The evaluation of the collaborative learning with cloud technology found that the learner are encouraged to study with cloud technology ($\bar{x}$ = 4.52) regarding to online collaborative learning theory; Idea Generating ($\bar{x}$ = 4.67), Idea Organizing ($\bar{x}$ = 4.40) and Intellectual Convergence ($\bar{x}$ = 4.48).

**Keywords:** Constructivism, Learning Environment, Cloud Technology, Collaborative Learning, Higher Education

## 1. Introduction

Nowadays technology education has evolved dramatically. In order to comply with teaching in digital society, cloud processing technology becomes popular for online learning. At the present days, cloud technology used in widely in classroom such as Google Apps which can create, store document, communicate and support collaborative learning that broaden learners' point of view, create and manage ideas and intellectual fusing (Hararim, 2012). So it is interesting to develop learning environment based on Constructivist to promote cloud collaborative learning to apply in leaning that focus on learners' collaborative learning and knowledge with their highest potential.

## 2. Literature Review

Constructivist Learning Environment

Viewing constructivism as a different perspective from objectivism on the learning process and a complementary learning tool with objectivism, (Jonassen, 1999). Proposed a model for designing constructivist learning environments. The CLEs theory assumes that the problem drives the learning, rather than acting as an example of the concepts and principles previously taught. Social learning: Learning is to construct knowledge individually and/or socially based on learners' interpretations of experiences in the world. Instruction is to engaging learners in meaning making (knowledge construction) (Kanjug, Chaijaroen, and Samat, C., 2015). The CLEs theory suggests a set of instructional methods including selecting and providing appropriate problem, related cases or worked examples, learner-selectable information, cognitive tools, collaborative tools, social/contextual support. Instructional activities could involve modeling, coaching and scaffolding in the CLEs.

Collaborative Learning

It is an educational approach to teach and learn by groups of students to work together, think, and solve problems, complete tasks (Kanjug, 2014). Learners are encouraged to engage in discussion, active learning techniques, collaborative work, learn new things and share their ideas by reflects to their classmates. The collaborative learning was designed according the core design principles of Online Collaborative Learning Theory (Hasrasim, 2012). There are three phases of knowledge constructions through discussion. First, Idea generating means the brainstorming phase which their ideas are gathered and divergent. Second, Idea organizing means the phase that their ideas are compared, analyzed and categorized through discussion and argument. Third, Intellectual convergence means the phase of their ideas are synthesis and be able to apply their knowledge.

Cloud based Learning

Students learn from cloud technology by logging into a provider's site such as program system, application on internet network. It can facilitate students to learn new knowledge effectively because they can access into their learning material wherever they wish which support their learning, sharing information and reliable storage.

## 3. Method

This research consists of document analysis and survey and analyzes data in quantitative and qualitative method.

### *3.1 Learning Environment Design*

Synthesis of learning design of learning environment base on Constructivist framework to facilitate learning on Cloud technology according to 5 bases as shown in Table 1

Table 1: Supporting for restructuring

| Principles | Environment | Cloud Technology |
|---|---|---|
| Cognitive restructuring and collaborative learning | Problem Based and Task | WixTool, Fackbook |
| Support Cognitive structuring and problem solving collaboration | Resource center | WixTool,Youtube, Google App |
| Promote collaborative learning | Collaboration | WixTool,Youtube, Google App, Mindmeister |
| Facilitate and enhance intellectual balance | Scaffolding | WixTool, Fackbook |
| Facilitate and enhance intellectual balance | Coaching | WixTool, Fackbook |

### *3.1.1 Cognitive restricting and collaborative learning*

The design based on "problem base" The problem context: a description of the physical, organization, and sociocultural context in which the problem occur should be represented to the learners. The situations were created to use in the classroom related to computer and ICT to teach and learn. The text and pictures were modified to create problem representation to help the students understand better about the problem and situations. They need to help each other to solve the problem in their group through Google cloud. This theoretical concept was adopted into practice and designed as "Problem Base" as shown in Figure 1.

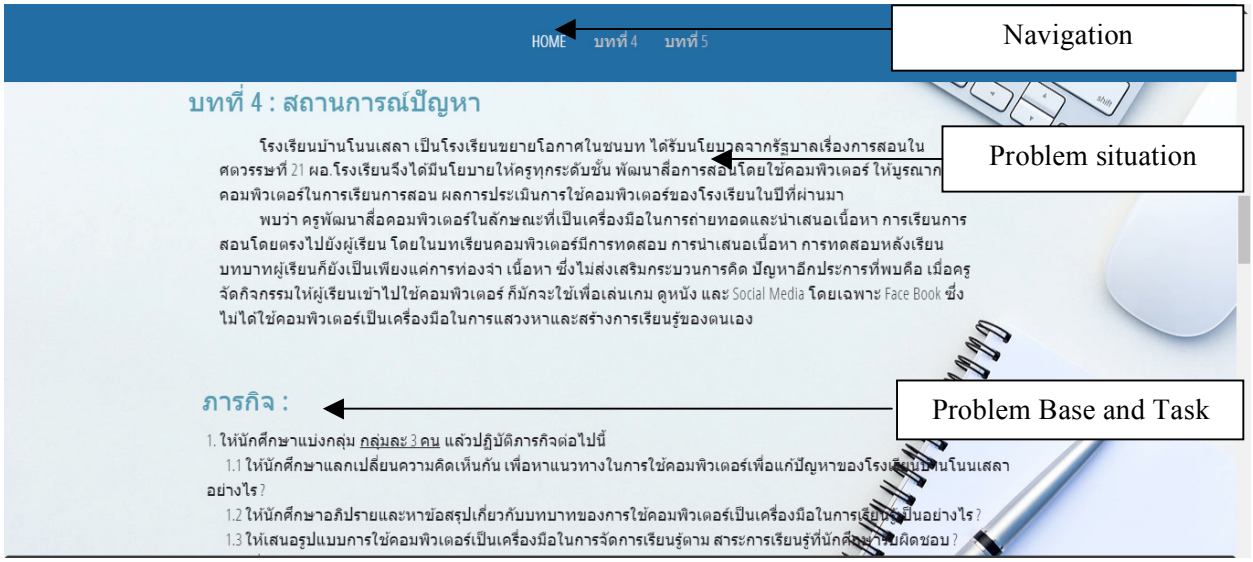


Figure 1. Problem Base and Task

### *3.2.2 Support Cognitive structuring and problem solving collaboration*

It was designed as information resources and online collaboration. CLEs have to provide just-in-time information to help learners comprehend and solve the problem. Collaboration tools were used to work together such as doc, slide, form which the group members can share their ideas and work. This theoretical concept was adopted into practice and designed as "Resource center" as shown in Figure 2.


Figure 2. Resource center

### *3.2.3 Promote collaborative learning*

When the students face with problem in their tasks but they cannot learn or balance their cognitive structuring. This was designed base on Online Collaborative Learning Theory (Harasim, 2012, Meepiaen, 2015) with three ideas; Idea generating, Idea organizing, and Intellectual convergence. Therefore, this design focuses on the students' interaction, exchange their ideas and discuss with their classmate. This can be another way to learn and balance their knowledge. This theoretical concept was adopted into practice and designed as "Collaborative Learning Center" as shown in Figure 3.

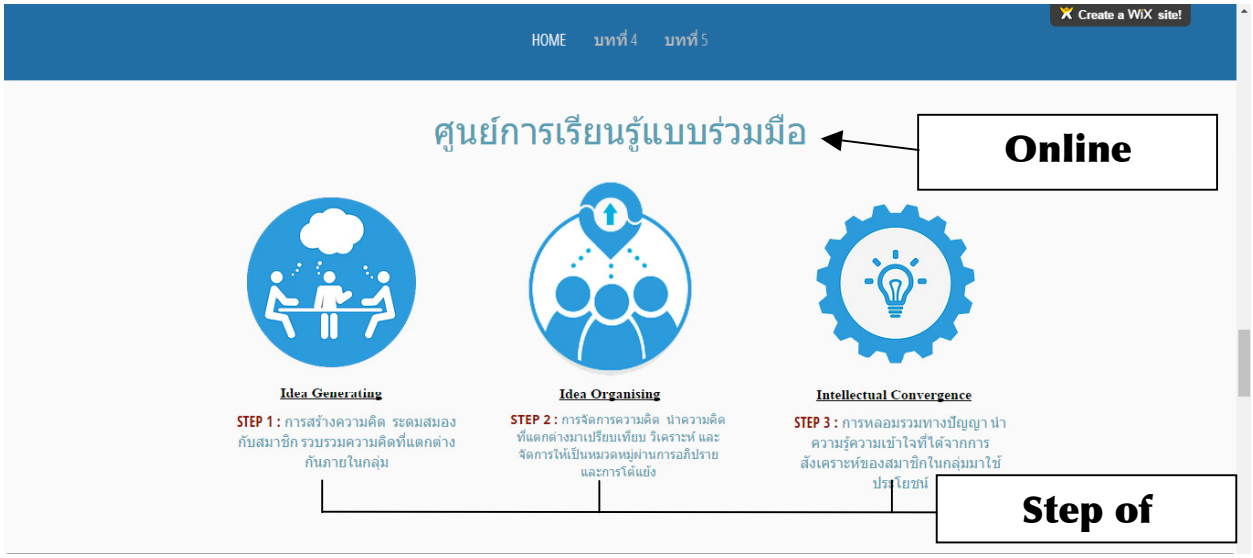


Figure 3. Collaborative Learning Center

### *3.2.4 Facilitate and enhance intellectual balance*

The objective of design is for scaffolding and coaching. The constructivist learning influences teacher to become more coach rather than just teach which is to support, encourage, imply, and give the learner advice. Coaching can help students to generate idea and learn to gain knowledge themselves. Coach needs to be an observant, a listener, and a questioner in order to promote students critical thinking skill. Scaffolding is a systemic approach to supporting the learners in different aspects of the learning environment (the tasks, the teacher, the learner, the materials, the tools): based on learner's level of understanding and need, adjust task difficulty, restructure the task. This theoretical concept was adopted into practice and designed as "Scaffolding" as shown in Figure 4 and provide alternative assessments with the technology of Facebook, messenger and Google hangout. This theoretical concept was adopted into practice and designed as "Coaching" as shown in Figure 5.


Figure 4. Scaffolding

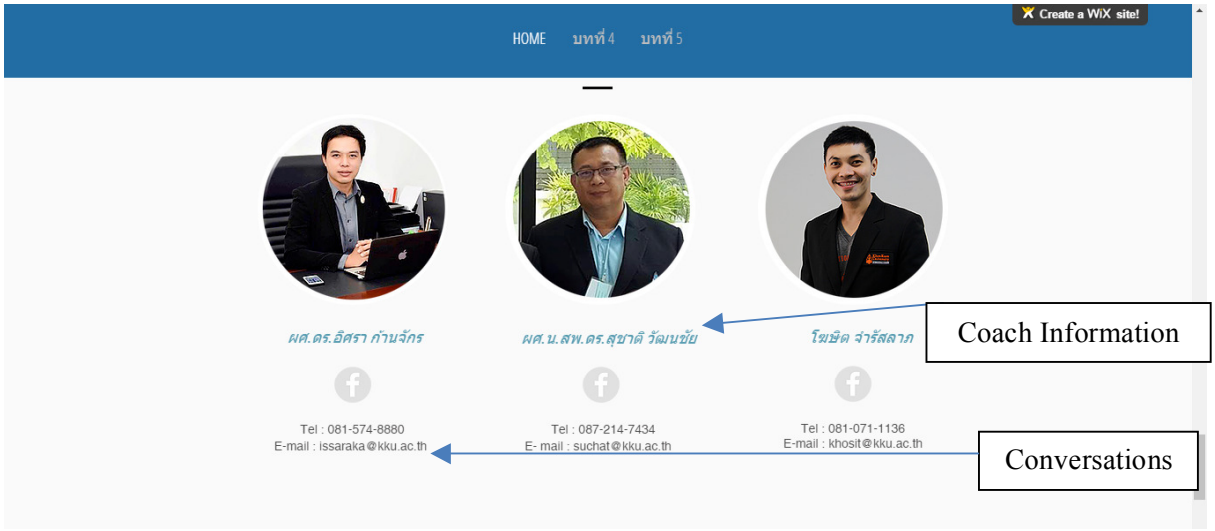


Figure 5. Coaching

### *3.3 Pilot Study*

Constructivist learning environment to enhance cloud based collaborative learning which was developed according to theoretical framework and checked by expert and pilot to 29 undergraduate students to examine the context of learning environment.

#### *3.3.1 Participants*

1) A lecturer of Innovation and information technology for learning
2) An expert in Innovation and information technology for learning to check the validity of the content
3) 29 undergraduate students

#### *3.3.2 Research Instrument, Data Collection and Analysis*

##### *3.3.2.1. Research instrument*

1. Constructivist Learning Environment to Enhance Cloud based Collaborative Learning consist of
   a. Situation
   b. Resource
   c. Procedural scaffolding
   d. Collaborative learning center
   e. Coaching

2. Collaborative learning evaluation was developed on the basis of Online Collaborative Learning Theory (Harasim, 2012) and the assessment of collaborative learning form of Meepian (2015).

##### *3.3.2.2. Data Collection*

Introduce the task
1. Explain and guide the students to learning environment
2. Divide them in a group of 3 students to study the context

Learning Process

1) The students in each group join Constructivist learning environment on cloud where they had assigned task to finish
2) The students find the answers from the provided menu which consist of situation, resource, procedural scaffolding, collaborative learning center, and Coaching.
3) The students help each other to solve the problem and find the solution on their own on cloud
4) Teacher and researcher support and facilitate them to think and study the information in every provided design.

Then the group control has used network from the constructivist learning environment where emphasize on Cloud collaborative learning for 1 week and 4 hours for group discussion in class room

## 4. Results and Discussions

According to data analysis from the evaluation survey concerning to their collaborative learning on cloud technology under three phrases of knowledge construction through discourse in a group, it revealed that students participated and exchanged their ideas among the group members on cloud the most at ($\bar{x}$ =4.52). To consider the result according to online collaborative learning theory (Harasim, 2012; Kumpang, and Kanjug, 2015; Meepiaen, 2015), it found that the students in Idea generating phase, had significant role at ($\bar{x}$ =4.67). The members in group were able to share and reflect their ideas with the highest mean at ($\bar{x}$ =4.76) while gathering ideas to solve the problem at ($\bar{x}$ =4.52).

In Idea organizing phase, overall represent the highest number at ($\bar{x}$ =4.40). It showed that learners were able to share different point of view to compare and analyze together at ($\bar{x}$ =4.41). Leaners showed the lowest ability in sorting and categorizing ideas through discussion at ($\bar{x}$ =4.38).

In Intellectual convergence phase, the result showed their dominant role at ($\bar{x}$ =4.48). According to the highest mean, it revealed that every student agree to summarize what they discuss and converge their ideas from the group members at ($\bar{x}$ =4.59) while the lowest mean showed that the students create their knowledge and broaden their ideas at ($\bar{x}$ =4.31) as shown in Figure 6.

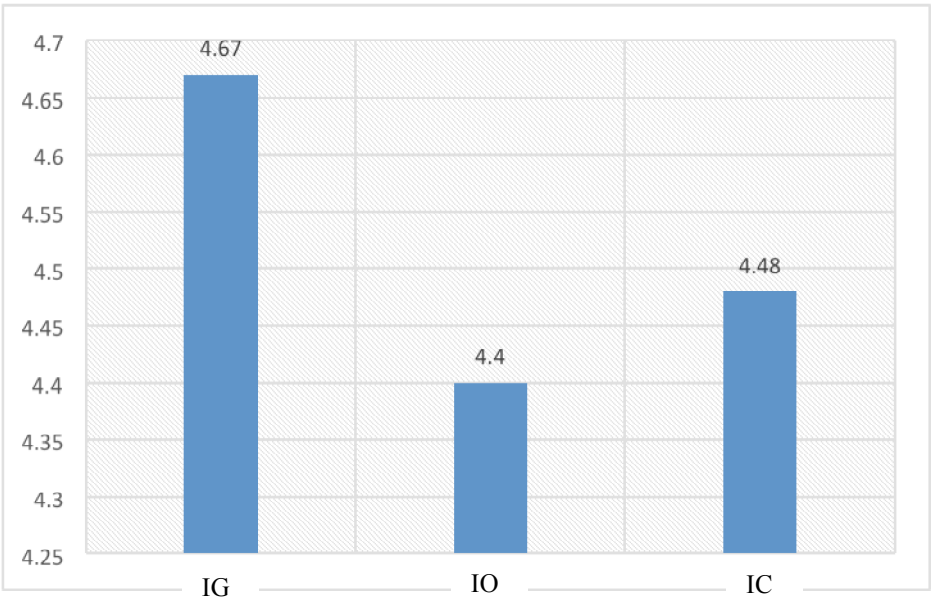


Figure 6. Result of Collaborative Learning Evaluation

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