

# A Framework of Online Collaborative Learning by using Inquiry Process

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## Abstract

This paper presents a framework of collaborative learning through the process of seeking knowledge in order to develop a prototype for an on-line inquiry-based learning management system. The objective is to synthesize and evaluate the suitability of the components, processes, and tools used in collaborative learning processes. The proposed framework consists of three main parts: 1) Supporting Module for Trainers 2) Collaborative Learning Module, and 3) Inquiry-Based Learning Module. This paper also presents various tools to support collaborative learning of each individual efficiently. To ensure the completeness of the proposed framework and make it succeed, the framework was evaluated by using a survey research. The primary steps include: defining a sample group, developing a questionnaire, collecting the data, and presenting conclusions and discussion of the results. The results of evaluation collected from 14 experts showed that an appropriateness of the conceptual framework is at high level and

can be applied to the model for an efficient teaching and learning process.

**Keyword:** Collaborative Learning, Inquiry Learning, WebQuest

## 1. Introduction

Education is the key for human resource development to develop individual knowledge, behavior, and virtues. It can be said that education is the most important foundation to create quality society and country. Students nowadays are grown within online environment; so, technology is a part of learning and teaching. The researcher is interested in developing a new teaching model focusing on collaborative learning to improve individual capacity by helping each other in the group.

Collaborative learning and knowledge seeking process have been studied by several researchers such as Sutip Pengthong and others [1] who studied on "the development of Pins WebQuest to develop thinking ability and learning autonomous". The subjects included 40

students in IT Department of Rajabhat Ubonratchathani University. The results showed that with the developed learning model, learners achieved better knowledge with higher thinking skills at the statistical significance 0.05 and reported high satisfaction on the Pins WebQuest Model. Wattana Punyarit [2] conducted a study on “The effect of collaborative teaching on the personal relationship and responsibility of students in the Department of Primary Educational management, Rajabhat Pranakorn University”. The results showed that the students showed higher relationship and responsibility at the statistical significance 0.05. They reported high satisfaction on the collaborative learning at the mean of 4.49.

The researcher has an idea to develop a “Framework on collaborative learning through WebQuest” by focusing on teamwork skills to develop each student’s potential and to achieve learning objectives. There are 3 main components of collaborative learning which include 1) trainer supporting module, 2) collaborative learning module, and 3) inquiry learning module. It is expected that the developed model will help learners achieve better knowledge and behavior.

This paper is organized as follows. Section II reviews related works. Section III presents the framework of our proposed

scheme. Section IV presents the tools for collaborative learning processes. Section V discusses the evaluation results. Section VI provides a summary and conclusion.

## 2. Literature Review

During the past 30 years, there have been various learning models starting from lectures in teaching center style, student center activities, and blended learning model. The objectives of these models are to promote learning achievement and appropriation to learners. This article presents the research relating to collaborative learning and Inquiry process. Suthip Pengthong et al [1] conducted a study on “the development of Pins Inquiry process Learning Model” to encourage autonomous learners which was trial with 40 students in the Department of Information Technology, Rajabhat Ubonratchathani University. The results showed that learners developed self-autonomous and thinking skills with higher learner’s achievement at statistical significance 0.05. The students also reported high satisfaction on the developed learning model. Wattana Punyarit [2] investigated on “The effect of collaborative learning model on the relationship between personnel and responsibility”. The subjects were third year students in the Department of Primary Education

Management, Rajbhat Phranakorn University with the results that after learning with the collaborative model, the students showed better relationship skills and more responsibility with the statistically significant level 0.05 and high satisfaction at 4.49. Moreover, there are several researchers who developed Inquiry process model such as Minner et al [3] who conducted the experimental study in Chemistry. The results showed that students achieved better with this model. Zachos et al [4] revealed that secondary students could develop thinking ability especially on natural laws and could pass the achievement test in a shorter time.

With the researches mentioned above, inquiry process and collaborative learning show positive effect on learning achievement. This article presents the framework based on inquiry process and collaborative learning for the development of effective teaching model to be in line with the advanced technology and the change of learners' behaviors.

### **3. The Objective of Study**

3.1 To develop a framework of an online collaborative learning by using an inquiry process for Thai under graduate students.

3.2 To synthesize and evaluate the suitability of the components, processes, and tools used in the proposed learning framework.

### **4. The proposed Framework of Online Collaborative Learning by using Inquiry Process**

This section addresses how to design the proposed framework and explain a main component working based on Student Teams Achievement Divisions (STAD) technique [5] and inquiry-based learning. The three main components are as follows:

#### *4.1 Collaborative Learning Module*

This module is a part of the collaborative learning that allows any activity in which two or more people work together to create meaning, explore a topic, or improve skills for the solutions. The group members recognize that each individual is a part of a group. Moreover, it allows trainees to discuss, clarify and evaluate ideas. This module fosters the development of critical thinking through discussion, clarification of ideas, and evaluation of others' ideas. In general, the group teaching technique depends on teacher, learner and content. One of the most interesting for group teaching is STAD [5], TAI [7], CIRC [6] and Jigsaw [8]. It is a type of collaborative learning that divides students into groups of mixed ability about four to five students per group. They help each other in the group to learn the contents provided by the teacher, do the test, and check their scores. The achievement of the team is evaluated by totaling the scores of their members. So, the target of

this method is that the students help each other for the success of the group. There are 5 steps of a learning process.

4.1.1 Present the content and simulate the situation for learners to join the process.

4.1.2 Join group learning by everyone in the group helping to find the solution of the problems provided by the teacher. They do the discussion to prepare everyone in the group for the quizzes.

4.1.3 Do the test individually to evaluate their knowledge.

4.1.4 Consider each student's score to encourage their learning. The scores are summarized in the group to evaluate group achievement.

4.1.5 Announce the score of each group and present the reward to the highest one.

#### *4.2 Inquiry learning Module*

Inquiry-based learning is an approach to teaching and learning that places students' questions, ideas and observations at the center of the learning experience. Learner plays an active role throughout the process by establishing a culture where ideas are respectfully challenged, tested, redefined and viewed as improvable, moving learner from a position of wondering to a position of enacted understanding and further questioning. Inquiry

learning module includes 6 steps of WebQuest learning.

4.2.1 Introduction: is the preparation step before joining the activities. It is in the form of problem solving activity.

4.2.2 Task is the problem step that learners must be able to find the solution.

4.2.3 Process step is the step to explain learners about the activities to achieve the task.

4.2.4 Resources are the information sources provided via the Internet.

4.2.5 Evaluation is the step to test learners' achievement along with the objective.

4.2.6 Conclusion is the step for learners to discuss their knowledge concept.

#### *4.3 Trainer Supporting Module*

This part consists of several tools to support teacher such as location, activity rules, content of the subject, suggestions, learners' behavior observation, real time response, and non-real time response.

#### **4.4. Supporting Tools**

This section addresses the Web 2.0 tools, which can be used for collaborative learning in the proposed framework. The several Web 2.0 tools are as follows:

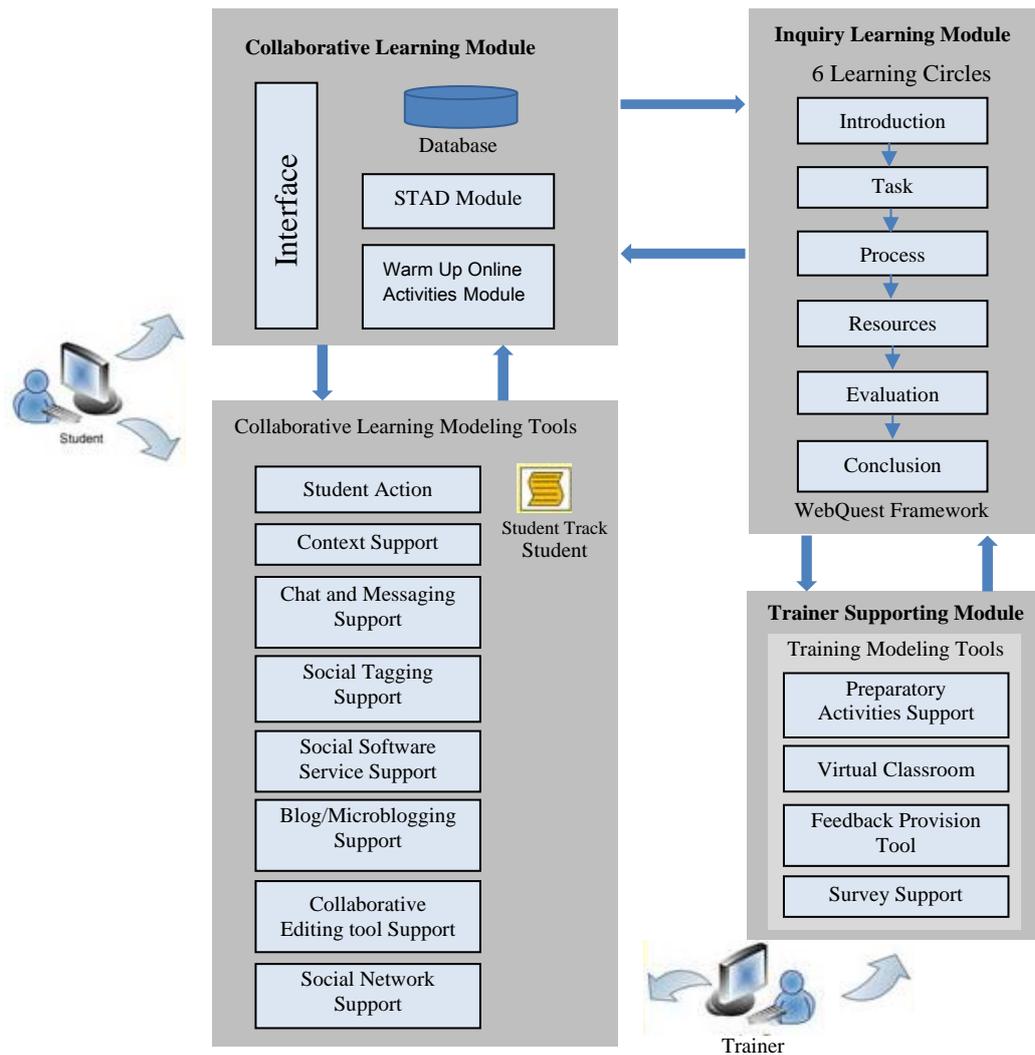


Fig. 1. The typical architecture and components of the proposed framework

4.4.1 *BLOGS*: A website with entries provided in chronological order. Blogs can be used for a variety of purposes, ranging from reflective learning shared with others online through to dissemination channels for organizations. Blogs are often used by experts in order to disseminate particular knowledge.

4.4.2 *MICROBLOGGING*: This is another type of blog with very short posts of up to 140 characters.

They are often used to share web links or other kinds of information. The most popular microblogging service is Twitter ([www.twitter.com](http://www.twitter.com)).

4.4.3 *WIKI*: A wiki refers to a collaborative Web-based authoring environment. The term wiki comes from an Hawaiian word meaning 'quick' and the origins of the name reflect the aim of the original design of wikis to provide a very simple authoring environment

which allows Web content to be created without the need to learn the HTML language or to install and master HTML authoring tools. The most popular wiki services are Wikispaces ([www.wikispaces.com](http://www.wikispaces.com)) and Pbwiki (<http://www.pbworks.com>)

4.4.4 *PODCAST*: A podcast is a series of digital audio files that are released episodically and often downloaded through web syndication to portable MP3 players, such as iPods. One of the most popular podcasting hosting services is Podomatic ([www.podomatic.com](http://www.podomatic.com)) while Audacity ([www.audacity.sourceforge.net](http://www.audacity.sourceforge.net)) is a popular free audio editor for recording, cutting, and mixing audio.

4.4.5 *SOCIAL SOFTWARE SERVICES*: Applications which provide sharing of different resources such as bookmarks, photographs, etc. Examples of popular social software services include: Flickr: for sharing photos, ([www.flickr.com](http://www.flickr.com)), Slideshare ([www.slideshare.net](http://www.slideshare.net)): for sharing slides and presentations and Scribd ([www.scribd.com](http://www.scribd.com)): for sharing presentations and documents.

4.4.6 *SOCIAL NETWORKS*: Communal spaces which can be used for group discussions and sharing of resources. Two of the most popular social networks services are Facebook ([www.facebook.com](http://www.facebook.com)) and LinkedIn ([www.linkedin.com](http://www.linkedin.com)) for professional networking.

4.4.7 *SOCIAL BOOKMARKING/TAGGING*: A bottom-up approach to provide tags for resources and to allow them to be retrieved. One of the most popular social bookmarking services is Diigo ([www.diigo.com](http://www.diigo.com)).

4.4.8 *SYNDICATION TECHNOLOGIES*: RSS and Atom formats have been developed to enable content to be automatically embedded elsewhere. Rich Site Summary or Really Simple Syndication was initially developed to support the reuse of blog content. The Atom format was developed as an alternative to RSS. One of the most popular RSS readers is Google Reader ([www.google.com/reader](http://www.google.com/reader)).

4.4.9 *MASHUP SERVICES*: A mashup is a service which combines data and services from multiple sources. Two of the most popular mash up services are Pageflakes ([www.pageflakes.com](http://www.pageflakes.com)) and Netvibes ([www.netvibes.com](http://www.netvibes.com))

4.4.10 *COLLABORATIVE EDITING TOOLS*: These tools allow users in different locations to collaboratively edit the same document at the same time. As yet, most of these services do not allow for synchronous voice or video communication, so the use of third party synchronous communication systems is often needed to co-ordinate editing activity. Two of the most popular collaborative editing tools are Googledocs ([www.docs.google.com](http://www.docs.google.com))

used for simultaneous text editing and Voicethread ([www.voicethread.com](http://www.voicethread.com)) for collaborative editing of presentations of photographs and/or videos together with text comments.

4.4.11 *SURVEYS*: These tools allow users to set up a poll and embed the poll widget in a blog or website and then track the responses on the website. Two of the most popular tools are Polldaddy ([www.polldaddy.com](http://www.polldaddy.com)) and SurveyMonkey ([www.surveymonkey.com](http://www.surveymonkey.com)).

4.4.12 *VIRTUAL CLASSROOMS*: Applications or software that allow collaboration in a virtual classroom. These provide users a variety of different tools including audio, whiteboard, chat and screen sharing. The most popular applications include Adobe Connect ([www.adobe.com/products/adobeconnect.html](http://www.adobe.com/products/adobeconnect.html)), ClickMeeting ([www.clickmeeting.com](http://www.clickmeeting.com)) and Spreed ([www.spreed.com](http://www.spreed.com)).

With the tools mentioned above we need to select suitability tools for trainer, student, content, and quality of network. In this paper, the suitability tools are evaluated for the appropriateness by asking specialists. Therefore, the typical architecture and specialists with overall results of the proposed framework show in figure 1 and table 1 respectively.

**Table 1** The result of the appropriateness of the collaborative learning tools

List of collaborative learning tools	Level of the appropriateness		
	High	Medium	Low
Blogs	✓		
Microblogging	✓		
Wiki		✓	
Podcast			✓
Social Software Services	✓		
Social Networks	✓		
Social Bookmarking/Tagging		✓	
Syndication Technologies			✓
Mashup Services			✓
Collaborative Editing Tools	✓		
Surveys	✓		
Virtual Classrooms		✓	

#### 4.5. Framework Evaluation

To ensure the completeness of the proposed framework and make it succeed, the survey research is used to evaluate the framework in this study. This section presents how to evaluate the framework for an efficient

teaching/learning process. The methods are as follows:

1. Study related articles and research papers including collaborative learning, Inquiry process learning, STAD technique, social networks system for education, the national education act, and other related theories.

2. Design and create a framework for an on-line collaborative inquiry-based learning management system (see the detail on above section).

3. Define a population and select the samples that are computer education experts. They need to graduate master or above in related field of computer or education and must have 3 years of experience. The 14 experts are selected by using purposive sampling method

4. Developing a questionnaire

5. Collecting the data from questionnaire

6. Analysis the data by using statistical tools and discussion of the results

With the method mention above, we use the average statistical tools to measure the results of evaluation collected from 14 experts. The results showed that an appropriateness of the conceptual framework is at high level ( $x = 4.3 \pm 0.27$ ) and can be applied to the model for an efficient teaching and learning process. The main topics of evaluation include 1) typical

architecture and components, 2) Trainer Supporting Module, 3) Collaborative Learning Module, 4) Collaborative Learning Modeling Tools, and 5) Inquiry Learning Module. Moreover, this paper presents evaluation of various tools to support collaborative learning of each individual efficiently as shown in table 1.

Table 1 shows appropriate tools that are suggested by experts. There are many tools that are required for group learning. It is not complex technology and easy to use such as Blogs and Microblogging. While the types of online social networking tools have a direct impact on the changing behavior of the students. It is necessary to have such a system to facilitate both students and teachers. The system includes Social Software Services and Social Networks. Other tools include Podcast, Syndication Technologies and Mashup Services. The expert suggests that they can be used but do not directly impact on the learning process of the proposed framework. However, it may be useful in some cases or specific lessons.

## 5. Conclusion

A framework of online collaborative learning by using an inquiry-based process was presented in this paper. Along with the first objective of research, the proposed framework consists of three main parts: 1) Supporting

Module for Trainers, 2) Collaborative Learning Module), and 3) Inquiry-Based Learning Module. In addition this paper presents various tools to support collaborative learning of each individual efficiently. To ensure the completeness of the proposed framework and make it succeed, the framework was evaluated using a survey research. The results of evaluation collected from 14 experts showed that an appropriateness of the conceptual framework is at high level. It is not only applied to the model for an efficient teaching and learning process but also implementation the real system.

## 6. Suggestions

Although the results obtained from 14 experts found that the proposed framework was able to develop a real system but some aspects should be considered in order to improve the efficiency and effectiveness for implementation. Some suggestions include the evaluation of the following issues:

6.1 The appropriateness by asking from students and learners.

6.2 The appropriateness by asking from teachers and trainers.

6.3 The appropriateness of collaborative learning tools by asking from students and learners.

6.4 The performance of network in term of speed respond in real-time to exchange the data.

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