

Development and Evaluation of CSCL Based on Social Presence

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Abstract: This study aims to develop and conduct formative evaluation on CSCL system based on social presence. This system consists of four parts; chat display, concept mapping, file sharing, and posting area, which enhance social presence and encourage learning behavior such as active discussion. The effect of this system was evaluated from the viewpoints of social presence and contribution to learning. The results showed that effect of each function on learning was perceived positive. However, the result also revealed that the function of the enhancement awareness to social presence would be needed.

1: Introduction

1-1: Research background

Recent year, interest has grown in collaborative learning such as project-based learning (PBL) in higher education for fostering high-end learning skills. Collaborative learning promotes positive attitude and participation in learning, as well as learning behavior. However, there are several problems, in order to conduct collaborative learning. One is the difficulty in adjusting schedules for collaborative learning due to the difference of class among learners (Nishimori et al, 2005). Nishimori et al (2005) pointed out that this problem leads to the lack of group cohesion, which delay the task achievement progress.

As information technology advances, interest has grown in using computer networks for Computer-Supported Collaborative Learning (CSCL), in order to solve the problem above. Many universities often use Computer-Mediated Communication (CMC) tools such as Bulletin Board System (BBS) with Learning Management System (LMS), and supports collaborative learning out of class.

Background theory of CSCL is socio-constructivism, which knowledge should be constructed and re-constructed through interaction between learners or learners and artifacts. In this view, it is important to allow learners to have active interaction in the process of collaborative learning such as communication. The relationship between learners, which is built through active interaction enhances group cohesion, and promotes active participation in collaborative learning in both face-to-face and computer-based environment.

This study aimed to develop and evaluate CSCL environment based on social presence, which contributes to enhance learning motivation and achievement.

1-2: Social Presence

In light of the spread of e-learning, one of the useful viewpoints of evaluation in CMC use in learning is social presence. Learners' perception of presence is affected by social presence, which Short, Williams, and Christie (1976) described as the "degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationship," that is, the perceived proximity to real time communication in face-to-face settings. Short, Williams, and Christie (1976) suggested that the two factors which promote social presence are "immediacy," which is the psychological proximity of the interlocutors and "intimacy," which is the perceived familiarity caused by social behavior such as eye gazing, nodding, and smiling. White (2004) suggested that interactive learning is more effective than one-way (noninteractive) learning; however, a relevant concern is the connection between learning and interaction. Social presence is a significant concept for considering the method of connecting interaction to learning. Social presence is an important factor for promoting learning in distance learning (McIsaac & Gunawardena, 1996) and is considered to be emotionally effective. It enhances learners' satisfaction with learning (Gunawardena & Zittle, 1997).

In traditional text-based CMC, which lacks social cues, learners tend to increase their social presence in continuous communication by expressing their emotions in ways such as using emoticons. Derks et al. (2008)

suggests that nonverbal devices have social meaning, for example, feelings, and transmit it from person to person. Social presence plays an important role in this transmittance. An invisible situation has a special influence on realizing and understanding an interlocutor's feelings, due to the absence of social cues in receiving messages from the interlocutor (Derks et al., 2008).

Learners can also increase their social presence in text-based CMC through the community created by learners during communication or with the teacher's effort (Gunawardena, 1995). Moreover, social presence has a greater effect on an active community with increased frequency of interaction between learners; as a result, it promotes learners' engagement in communicative learning. Lomicka and Lord (2007) also pointed out that social presence affected an active community; in particular, social presence concerning interaction was the most frequent. It led to better performance than that in individual learning in terms of received responsibilities and precise description skills. Lomicka and Lord (2007) suggested that social presence enhances the interaction between learners, which, in turn, affects learning performance.

However, social presence also has a bad influence on learning. Yamada and Akahori (2007) insisted that learners in using communication media which allows learners to perceive social presence did not concentrate on learning in learner-centered learning. Therefore, it should be considered the system design which the enhancement of social presence leads to learning behavior. This study also aimed to illustrate the direction of design the function which promotes learning with the enhancement of social presence.

2: System

2-1: System concept

As mentioned above, one issue in this study is how to make a bridge between the enhancement of social presence and learning behavior. In order to allow learners to be engaged in learning, concept map, which enables learners to organize ideas and opinions, can be effective on the design. The function of organizing ideas and concept promotes communication, as a result, leads to high performance in CSCL (Funaoi et al, 2003). This system developed in this study will allow learners to be aware of other learners' presence and be engaged in task efficiently.

2-2: System architecture

This system is a client/server system. Clients consist of software allowing chatting, concept mapping, and sharing files. The server side consists of chatting management, concept map sharing, and file sharing management. All client software for all system types was developed in Action Script 3.0, and can be used on web browsers with the Flash Player plug-in 9.0 or later installed. If the Flash™ Player plug-in is not installed, or if the installed version is too old, most web browser software currently in common use (including Microsoft Internet Explorer, Google Chrome, and Mozilla Firefox and so on) will allow the user to download and install the plug-in automatically. The server software are implemented in PHP 5.0 and use the Apache 2.2 web server with the PHP module; the use the Wowza Media Server 2.0. All of the server software runs on the same computer. Each function is explained in section 2.3.

2-3: System functions

This system allows learners to organize their idea and opinions with chatting and sharing information. In this system, learners can label their posting such as "opinion", "question" and "chatting among groups". The color of utterance area is different from the labels (e.g., "opinion" is green). When learners work with other, chatting function enables learners to sort postings by user name. It make easier to concentrate on collaboration. Learners can make concept map with group members. The figures which learners can select are circle, rectangle. Learners can write concept name or explanation on figures. Learners can link between concepts by line or arrowline, in order to describe the relationship or causal association.

File sharing function allows learner to share txt, picture (jpg and gif), and pdf file in group, in order to understand or suggest the basis for discussion. Thus, it can lead to active discussion.

2-4: Interface

The client interface consists of 4 parts; the chat display, posting area, concept map display, and editing area for concept map and file sharing. After learners log in, they move to this area. Figure 1 shows the interface of this system.

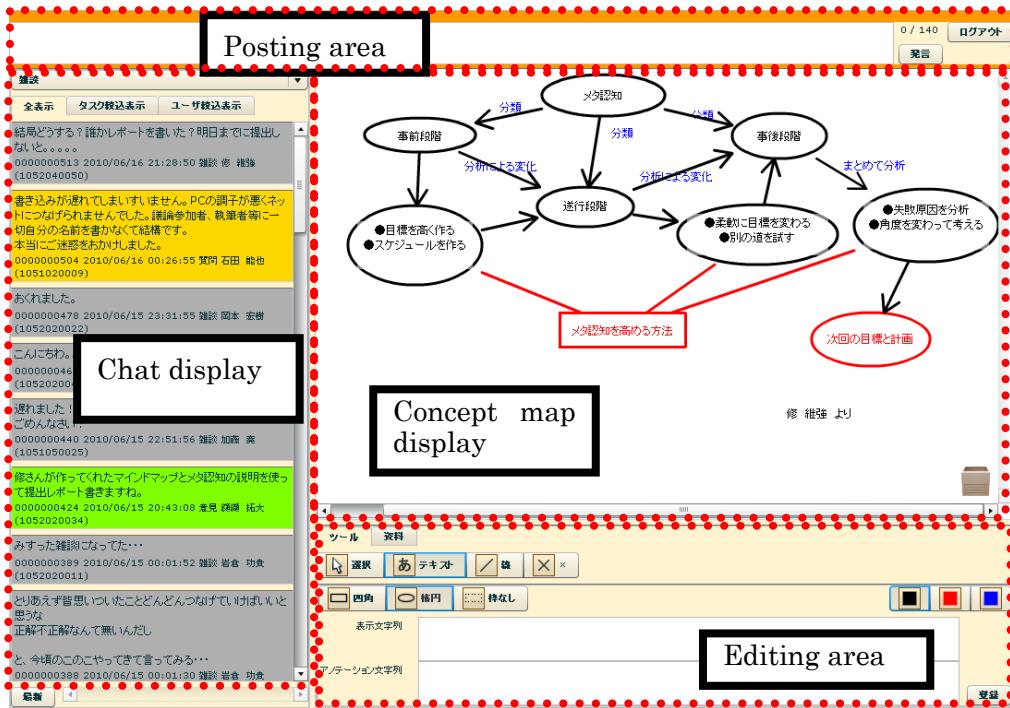


Figure 1: Interface of this system

3: Evaluation

3-1: Experiment design

The purpose of this study is to evaluate the effect of functions and point out problems from the viewpoints of social presence and relationship between social presence and learning behavior as formative evaluation. Subjects participated in learner-centered discussion about educational issue “Meta cognition and your career as collaborative task. Each group consisted of four or five learners. Before discussion, lecturer taught fundamental knowledge which learners need discussion in class. At the end of class, lecturer informed learners of discussion tasks out of class, and required them to use this concept map system. In order to use this system, learners were asked to adjust the schedule of online discussion using this system. Learners participated in each discussion for one week. Each learner in a group connected to this system from separate locations.

3-2: Subjects

The learners in this study were 33 university students. All learners were freshman. Computer literacy among them was high. All used computers everyday for e-mail, text-chatting, Internet, writing reports, programming and so on. Learners were divided into eight groups (each group consisted of four or five learners).

3-3: Data collection

The aim of this study is to investigate the contribution of each function to enhancement of social presence and learning as formative evaluation. Data was collected by questionnaire. All subjects were required to answer a questionnaire after one week. Questionnaires asked all subjects to rate the perceived effectiveness of each function on the enhancement of other learners and learning from 5-point rating scale. The following questions were asked:

- 1: Rate the perceived effect of the combination of chatting and concept map on the organization of your idea in group work (1: not at all - 5: very much)
- 2: Rate the perceived effect of the combination of chatting and concept map on active discussion (1: not at all – 5: very much)
- 3: Rate the perceived consciousness of the combination of chatting and concept map on the awareness of other's presence (1: not at all – 5: very much)
- 4: Rate the perceived effect of the categorization of chatting into the role on the organization of your idea in group work (1: not at all – 5: very much)
- 5: Rate the perceived effect of the categorization of chatting into the role on active discussion (1: not at all – 5: very much)
- 6: Rate the perceived consciousness of the categorization of chatting into the role on the awareness of other's presence (1: not at all – 5: very much)
- 7: Rate the perceived effect of red herring on the organization of your idea in group work (1: not at all - 5: very much)
- 8: Rate the perceived effect of red herring on active discussion (1: not at all – 5: very much)
- 9: Rate the perceived effect of red herring on the awareness of other's presence (1: not at all – 5: very much)
- 10: Rate the perceived effect of red herring on the understanding of other learners' intention in the discussion (1: not at all – 5: very much)
- 11: Rate the perceived effect of chatting among groups on active discussion (1: not at all – 5: very much)
- 12: Rate the perceived effect of chatting among groups on the enhancement of intimacy of other learners (1: not at all – 5: very much)
- 13: Rate the perceived awareness of other group procedure by chatting with other group learners (1: not at all – 5: very much)

4: Results

4-1: Evaluation of functions for collaborative learning from the view of social presence and learning

Eighteen learners out of thirteen three learners answered this questionnaire. The results of questionnaire show in Figure 2. Each function of this system basically had good evaluation rate, in particular, combination of concept map and chat, and categorization of chatting seemed to contribute to organization of learners' idea and active discussion. The effect of red herring in each group seemed to be recognized as the enhancement of social presence, which promotes cohesion of group members. Chatting among groups was not enough to enhance the intimacy to other learners, but direct learners' awareness to other group procedure. Thus, each function is perceived positive way to contribute to active group work.

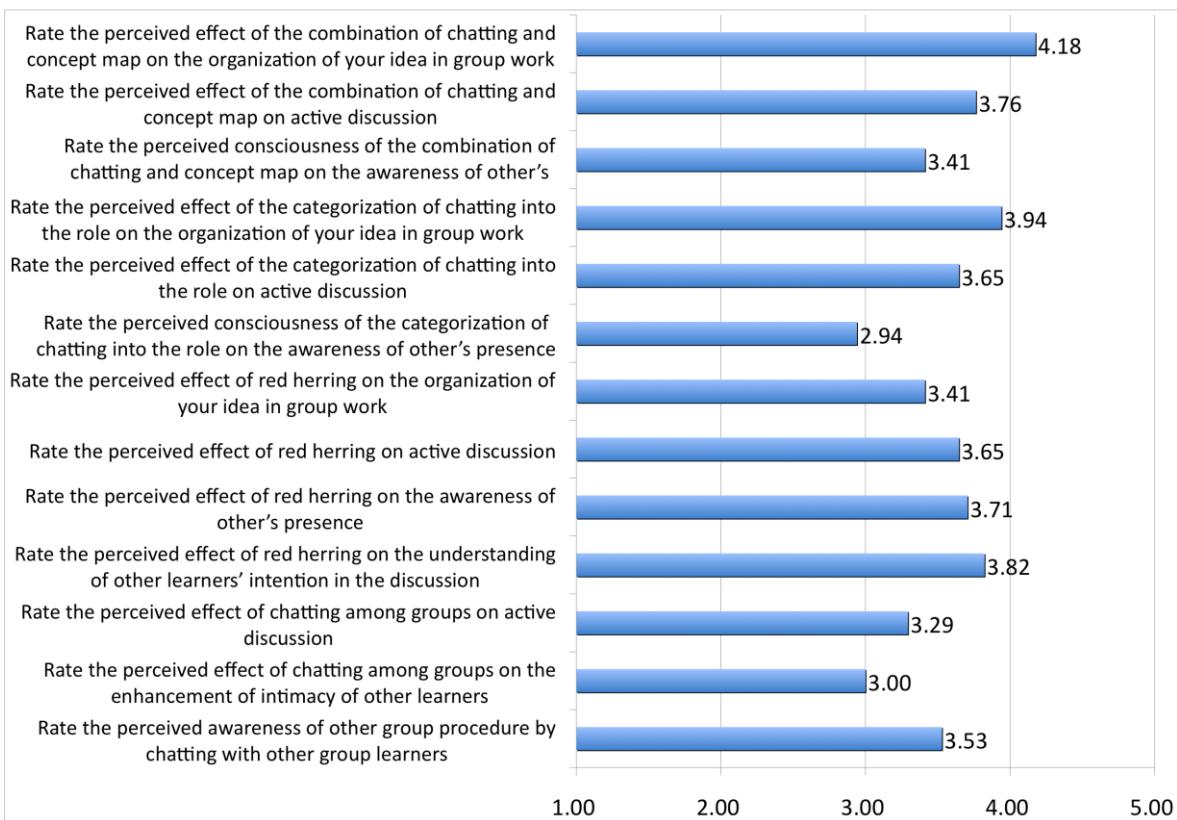


Figure 2. The results of effect of each function on the enhancement of social presence and learning

4-2: Opinions and suggestions from subjects

Some learners commented on functions. Some opinions confirmed positive effects of this system. Positive comments from many learners included the following:

Comment 1: I felt it easier to communicate in a chat style.

Comment 2: I felt it more natural to organize our idea in our group work by the combination of concept map and chat.

Comment 3: Categorizing chat in a role allows learners to be easier to organize and integrate our idea.

However, not all learners regarded this system as effective in a group work. Some learners felt a distance in communication pointed out problems caused by technical troubles and other issues. Problems pointed out by many learners are include:

Comment 1: I was bothered in using concept map. When I wrote report, I had to rewrite concept map.

Comment 2: I did not understand who logged in this system.

Comment 3: There was no simultaneous user, when I used.

5: Discussion

The findings from this formative evaluation suggest that each function, in particular, the combination of concept map and chatting, was perceived high evaluation. However, each function does not contribute to the enhancement of social presence. This is because few simultaneous learners participated discussion with the use of synchronous CMC, as learners commented above. On the other hand, chatting, which supports the enhancement of social presence, seemed to trigger understanding other learners' idea, and contributed to active discussion. Thus, the enhancement of social presence can promote learning behavior. Chatting with

other group learners raised learners' awareness of other groups' task procedure, it leads to be effective on facilitation of task achievement. The combination of chat and concept map helped learners to be engaged in effective group work. In order to be more effective function, the function which allows learners to use reference term in chat system for the discussion using concept map should be required to develop in next version.

6: Conclusions & future work

The purpose of this study was to develop and evaluate the effect of this system for raising social presence and learning behavior. Almost all of functions seem to be support active group work, but did not promote social presence due to the lack of simultaneous learners in chatting, and so on.

Future work towards the realization of effective group work based on social presence learning are recommended as follows:

(1): Implementation of functions which support the enhancement of social presence

Each function does not seem to contribute to promote social presence, pointed out above. Emoticon, reply, and nickname display seem to be effective on the enhancement of social presence, according to Garrison and Anderson (2003). In addition, visualization of relationship between learners, and annotation on concept map are considered as the effective functions.

(2): Increasing simultaneous learners

One of problems in this study is the small number of simultaneous learners when active learner used this system. It caused the lack of social presence, according to comments from learners. Experiment for the evaluation of each function as proto type should be required.

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