C4 (C quad): Development of the Application for Language Learning Based on Social and Cognitive Presences

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Abstract. This research aims to develop collaborative language learning systems based on social and cognitive presence for learning settings out of class, and evaluate their effects on learning attitude and performance. The main purpose of this system is focusing on the building of a learning community, therefore the Community of Inquiry (CoI) framework suggested by Garrison, Anderson, and Archer (2000) was considered to design this system. This system "C4" (spelled out as C quad) consists of three functions: chatbot, constitutive chat, and contribution visualization for the enhancement of social and cognitive presence. In this paper, we explain system design and architecture, and discuss future work.

Keywords: computer-supported collaborative language learning, social presence, cognitive presence, learning community.

1. Introduction

Recent language learning tends to be communicative language learning using Computer-Mediated Communication (CMC) in a context of learner-centered learning in order to foster practical communication proficiency (e.g. Lee, 2002).

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Previous research indicates positive effects of CMC on language learning, such as promotion of negotiation of meaning (e.g. Morris, 2005). It is suggested that CMC is effective on several perspectives of language learning, such as affective and productive performances, but one common issue in CMC-based learning is how to increase opportunities to touch the target language outside class, as well as active interaction between learners. In order to promote active interaction in CMC, building a learning community is one of the essential points for continuing online language learning. This study aims to design and develop a language learning support system "C4 (Constitutive, Cognitive, Collaborative Chat)" with reference to "Community of Inquiry", in particular, social and cognitive presences.

The CoI framework consists of three elements: social presence, cognitive presence, and teaching presence. CoI, "composed of instructors and learners as the key participants in the educational process" (Rourke, Anderson, Garrison, & Archer, 1999, p. 52), provides "the environment in which students can take responsibility and control of their learning through negotiating meaning, diagnosing misconceptions, and challenging accepted beliefs—essential ingredients for deep and meaningful learning outcomes" (Garrison, 2011, p. 22). Social presence is defined as "the ability of participants to identify with the group, communicate purposefully in a trusting environment, and develop personal and affective relationships by way of projecting their individual personalities" (Garrison, 2011, p. 23). Cognitive presence is enhanced by integrating ideas, exploration for relevant information, and so on (Garrison et al., 2000). Social presence is an important factor for promoting learning in distance learning (McIsaac & Gunawardena, 1996). It is said to be effective emotionally. Additionally, social presence seems to increase the learners' satisfaction with learning (Gunawardena & Zittle, 1997). Yamada and Akahori (2008) indicated that social presence in the use of synchronous CMC encouraged active interaction between learners using the target language, promoting the use of social cues. Several studies have revealed the effects of a learning support system based on social presence (e.g. Yamada, 2010; Yamada, Nishiyama, & Goda, 2012). Moreover, Yamada and Kitamura (2011) indicated that social presence has two aspects: perceived and expressive features. These two aspects should be considered for the design of a learning support system for language learning.

Cognitive presence supports critical thinking and learning discourse such as negotiation of meanings, facilitating analysis, and information integration (Garrison, 2011). Cognitive presence consists of four phases: triggering event,

exploration, integration, and resolution (Garrison, 2011). In order to create and enhance cognitive presence, integrating shared and private knowledge and thinking through learning discourse should be supported (Garrison, 2011). Finally, teaching presence is defined as "the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes" (Anderson, Rourke, Garrison, & Archer, 2001, p. 5). Teaching presence directs learners' awareness to academic purposes of learning activities. Instructors' or teachers' roles and activities in online discussion seem to have influence on the enhancement of teaching presence, unlike social and cognitive presence. This research aims to develop collaborative language learning for the enhancement of social and cognitive presence, and to evaluate its effects on learning. In this paper, we explain the collaborative language learning system that we developed.

2. System

Goda and Yamada (2012) suggested the design of a learning community in online discussion using a foreign language, based on three presences: social, cognitive and teaching presences. They suggested three points, viz. (1) students must be supported to enhance social presence; (2) teaching and social presence have effects on the promotion of students' contribution; and (3) teaching and social presence have significant correlation with satisfaction. The system "C^4" aims to support the enhancement of learner factors. Therefore, this system focuses on the enhancement of social and cognitive presences. "C^4" was developed as a module of the free learning management system (LMS) "Moodle" and it consists of three functions: chatbot, constitutive chat, and contribution visualization. Figure 1, Figure 2, and Figure 3 display the system interfaces.

2.1. Chatbot "Mondo"

Chatbot supports learners in constructing their ideas through communication with the chatbot before communication or discussion with other learners in constitutive chat. Chatbot asks questions about the learner's idea or opinion using Socratic questioning. The learner answers the questions. This function is assumed to promote the cognitive process of idea (re) construction. Chatbot seems to be effective in the enhancement of cognitive presence. Communicating with chatbot before discussion may encourage students to organize their ideas in English, and give them opportunities to practice English writing (Jia, 2004). The chatbot "Mondo" was developed based on Eliza (Weizenbaum, 1966), adopting Socratic dialogue methods.

2.2. Constitutive chat "CD-Map"

Constitutive chat "CD-Map" is a text-based communication tool with an idea-constitution support function. This function consists of two parts: a communication part in the left pane and idea construction like a mindmap in the right pane. "CD-Map" allows learners to post their ideas and opinions, register postings as "favorite" (similar to the "like" button in Facebook), use emoticons, and make relationships such as cause-and-result between postings. In order to make relationships, learners click and drag a posting object in the left pane to the right pane, and then learners make relationships between postings using arrow lines and the like, as in a mindmap. Learners can share their idea-construction map using their postings. Yamada et al. (2012) suggested that idea construction tools such as mindmaps make learners aware of the learner's contribution, critical thinking, and others' presence. This function is assumed to enhance social and cognitive presence.

2.3. Contribution visualization

Contribution visualization is meant to visualize the learner's contribution and log-in frequency, using a facial icon and a background color. If a learner's posting on a chat is registered as a "favorite" or used in idea construction by other learners, the system counts one contribution, and then changes the facial expression to a smile. The background color on the facial icon changes depending on log-in frequency. The change of background color occurs in four patterns: bright blue (log-in), darker blue (from one hour to 23 hours since the last log-in), orange (one day since the last log-in), and gray (over three days since the last log-in). This function supports the enhancement of social presence.

Figure 1. Top page

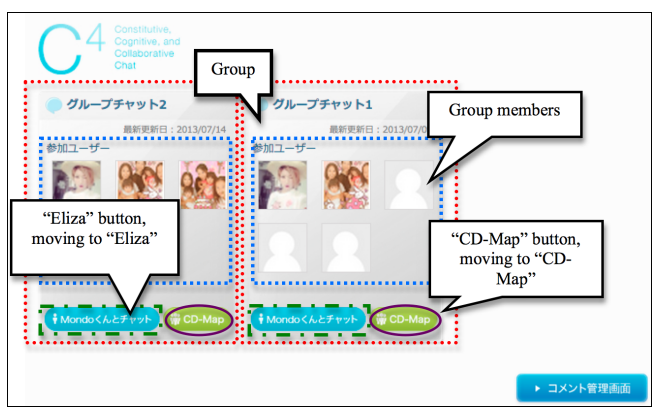
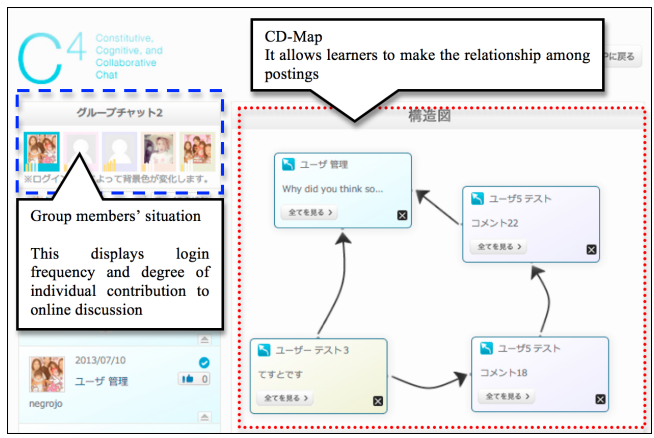


Figure 2. Interface of Chatbot “Mondo”

Figure 3. Interface of CD-Map



3. Conclusion and future works

The purpose of this study was to develop a collaborative language learning system based on social and cognitive presence. It is to be expected that the functions mentioned will be effective for the enhancement of both presence and learning performance. Future avenues of research are recommended as follows:

- Prototype evaluation: formative evaluation should be conducted into whether each function contributes to the promotion of social and cognitive presence.

- System modification: the results of prototype evaluation will suggest several problems with "C4". "C4" will be modified for a next version based on prototype results.

- Practical evaluation: this research aims to increase the opportunities to use a foreign language out of class. After the modification, effects of "C4" will be evaluated in out-of-class learning situations.

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