

## Application of CoI to Design CSCL for EFL Online Asynchronous Discussion

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### ABSTRACT

This chapter provides suggestions on how to apply the community of inquiry (CoI) to design computer-supported collaborative learning (CSCL) for English as a foreign language (EFL) learning. Online asynchronous discussion was focused and examined. A case study of five discussion activities with 42 students at a university in Japan, to investigate the relationships between CoI and (1) EFL learners' learning behavior, (2) their satisfaction with online discussion, (3) their perceived contributions to the discussion groups, (4) English proficiency as a foreign language, and (5) their interactions during the discussion, was reported and discussed. Suggestions were developed based on the study results: (1) students must be supported to establish open communication of social presence (SP) for productive learning behavior, (2) teaching presence (TP) and cognitive presence (CP) indicate students' satisfaction, (3) the design and organization of TP and the open communication of SP might be considered for student contributions to a learning community, (4) The CSCL activities may provide opportunities to practice English for all level students, and (5) students need help to establish SP first and then shift their focus to academic purposes. The results and discussion lead to the importance of the careful design of CSCL, including problem identification for the activities.

### INTRODUCTION

Computer-Supported Collaborative Learning (CSCL) has been used to help learners acquire higher-level cognitive thinking skills and adopt the constructivism, social-cognitive, and situated-learning theories. In English as a Foreign Language (EFL) learning settings, the use of CSCL has increased, because it gives learners more opportunities to apply and practice what they have learned. CSCL allows students to express their ideas and communicate with others. Students should use a foreign language to express ideas and communicate with others in CSCL programs, which could lead to a unique Community of Inquiry (CoI).

This chapter discusses the application of CoI that is used to design asynchronous online discussion for EFL learners. The asynchronous online discussion setting is particularly effective for EFL learners, because it provides sufficient time for learners to read other contributor's comments, think about those comments, and write their thoughts. The discussion could add useful information such as practical usage of CoI framework for CoI researchers who seek to determine the validity of the CoI framework. Furthermore, this research could be a useful tool

for practitioners to use when they design and implement collaborative learning environments for non-native English speakers. This chapter consists of three parts: (1) a literature review on the practice and impacts of CSCL on EFL learning; (2) a case study that explores the relationships among CoI and EFL learner behavior, learner satisfaction, and how CoI and EFL contribute to a community; and (3) the implications to CSCL design for EFL learners based on CoI.

## BACKGROUND

### CSCL and Language Learning

Due to the current pedagogical paradigm shift to constructivism, social constructivism, and situated learning, the importance of interaction and collaboration are strongly emphasized for effective and meaningful learning, encouraging the research and practice of Computer-Mediated Communication (CMC) for CSCL.

CSCL is an interactive learning environment based on the socio-constructive learning perspective. One of the key issues concerns how active and continuous interaction should be established in CMC (Barnes, 2008). In particular, interpersonal communication should be promoted to establish an active virtual learning community using social media. Collaborative learning, with high interaction between learners in both computer-based and face-to-face situations, can lead to high performance in socioemotional development, such as increased personal satisfaction (Benbunan-Fich, Hiltz, & Harasim, 2005). The background and the importance of CSCL interactions will be briefly discussed first, and current issues related to the social-presence concept will be organized.

### CSCL design for language learning

CSCL promotes cognitive change through group interaction and activities (King, 2007). Digiano, Goldman, and Chorost (2008) state that Information and Communication Technology (ICT) application can be the center of effective learning environments for distributed, interactive, collaborative and constructive learning, and learning assessment. The recent trend of using CMC tools, such as social media, for CSCL provides learners with opportunities to solicit and share knowledge while developing common ground with their peers and teachers (Rennie & Morrison, 2007).

Active interactions are essential for successful CSCL. Therefore, quality social interactions require a group atmosphere where individuals share experiences and knowledge (Reneland-Forsman & Ahlbäck, 2007). One common issue in CSCL concerns how to support learners' social interactions.

CMC is often used for language learning as the platform of CSCL. CMC is effective for the promotion of language learning through a high degree of interaction such as the production of target language utterance (Furstenberg, 1987). There are several reasons for the positive effects of CMC on language learning: the reduction of anxiety about utterance (Kelm, 1992), the ease of revision in the learner's utterances

before posting in the discussion (Lee, 2002), and the promotion of social interaction, which promotes the negotiation of word meanings where learners ask others for the meaning of words (Smith, 2002; Morris, 2005). These findings are related with the Second Language Acquisition (SLA) theory.

Long (1981, 1989) indicated that social interaction promoted communication and language acquisition through the active negotiation of meanings. Comprehensive input and output play an important role in communicative language learning.

Comprehensive input implies written or spoken information given in a language that the learner can comprehend (Krashen, 1985). In SLA, communication skills, in particular, are acquired through communication between participants. One example is the interaction between learners and teachers (Long, 1981). Interaction refers to meaningful communication that enables the understandings of and stimulates the production of comprehensive input. When people face a problem, such as a misunderstanding, they resolve the problem before continuing communication (Clark, 1994). For example, when learners cannot understand their interlocutor's utterance, they may ask that it be repeated, or the interlocutor may modify or paraphrase the statement to facilitate understanding.

Comprehensive output refers to learning activities, such as uttering, repeating, or writing, where students receive comprehensive input through interaction (Swain, 1995). Swain (1995) claimed that output has three functions: to identify the gap between what the learner can and cannot express; to hypothesize about testing, such as the trial-and-error method; and to perform metalinguistic functions, such as reflective learning.

The CSCL design for language learning has been discussed since the middle of 1990's, with the advancement and use of the Internet (Chapelle, 2001). In particular, researchers have been discussing asynchronous (ACMC) and synchronous (SCMC) CMC, which play a primary role in language acquisition. In ACMC, students learn the target language by self-pacing and reflection (Hiltz & Goldman, 2005). These students consider ideas and utterances, which raises their grammatical consciousness (Lamy & Hampel, 2007). However, self-pacing can become an obstacle in facilitating effective language learning through ACMC communication. Weller and Mason (2000) pointed out that ACMC reduces the pressure to reply to the interlocutors, forcing them to wait, sometimes a long time, for the student's reply. ACMC may weaken the effect of social interaction in communicative language learning.

The effect of SCMC on the second language learning was also reported. SCMC is similar to face-to-face communication, but it promotes more equal utterance than face-to-face communication (Chun, 1994), promotes active social interaction between learners (Smith, 2002), and allows learners to use various communication strategies (Lee, 2002). One disadvantage of SCMC is that high-proficiency learners tend to participate in discussions, which leads to more pressure for low-proficiency learners (Lamy & Hampel, 2007). Yamada (2009) focused on the communication media in SCMC, and he investigated the effect of communication media on psychological

factors and performances in communicative English learning. Yamada compared four types of SCMC: videoconferencing, audio conferencing, text chat with images, and plain text chat. He found that any media that allows the use of social cues creates positive psychological effects, such as the learning to communicate in English, and these psychological factors promote learning performance, including the number of speech and self-corrections, where learners correct their grammatical errors by themselves. Text communication promotes the confidence in grammatical accuracy, and then increases the amount of self-correction (Yamada, 2009).

Abrams (2003) reported interesting findings when compared ALCMC with SCMC from the viewpoint of utterance. The results revealed that language learners using SCMC outperform those who use ALCMC, and they did not use CMC at all in communicative language learning, in terms of the amount of speech in face-to-face discussion.

## RELATIONSHIPS AMONG COI AND EFL LEARNING

In this section, the relationships among three presences (social, cognitive, and teaching) of Community of Inquiry (CoI) and EFL online discussion will be explored, based on a case study held at the University in Japan. This relationship between CoI will be investigated in relation to (1) EFL learners' learning specific behavior, (2) learners' satisfaction with online discussion, (3) learners' perceived contributions to the discussion groups, (4) English proficiency as a foreign language, and (5) the learners' interactions during the discussion.

### Participants

Forty-two freshmen at Kumamoto University participated into the research (Male: 39, Female: 3), who were majoring in science. These students had the minimal computer skills and knowledge, such as keyboard typing, etc., required for participation in the study.

### Course Descriptions and Activity Design

The case study was used during a Computer Assisted Language Learning (CALL) course, which was a mandatory two-credit course for the freshmen at the university. The course was delivered in a blended manner, where face-to-face and online communication were both required. It had 15 face-to-face classes, and online activities were utilized outside of the classroom to enhance the face-to-face learning materials that were used. The five online discussion activities are illustrated in Table 1.

Table 1. Discussion Topics and Descriptions

The course was designed and implemented based on the Collaborative Problem Solving (CPS) approach (Nelson, 1999) in the instructional design (ID) and Teaching and Learning Guideline in CoI (Garrison, 2011). CPS provides the key

elements for the collaborative learning procedure, the outline of activities, and CoI integrates online learning features and the teachers' roles.

The online discussion activities gave the students more opportunities to practice their English skills and to prepare for the possibility of future international collaborative projects. The constructivist view perspective states that authentic inquiry, a divergent view, and collaboration promote student learning. The activities were designed based on the constructivist perspectives as well. For example, in the face-to-face class, Voice of America ([www.voiceofamerica.com](http://www.voiceofamerica.com)) was used as to create listening and reading materials to provide students with authentic contexts. In the Second Language Acquisition (SLA) theory, written and spoken materials in a targeted language were also viewed to increase comprehensive inputs (Krashen, 1985) for quality interactions. As discussed in the literature review section, interaction enables the understandings of and stimulates the production of comprehensive input.

The discussion activities were selected at the design phase of the instructional design, whose essential elements include analysis, design, development, implementation, and evaluation phases, because these activities could provide not only collaborative learning, but opportunities of comprehensive output in SLA (Swain, 1995). The discussion topics in Table 1 related to the news topics were selected by the instructor who considered the students' interests and familiarity in order to motivate the students, gather their attention, and relate their previous knowledge and/or experiences to the topic (Keller, 2010).

The bulletin board system (BBS) of the learning management system (LMS), Blackboard, was adopted for the discussion activities. All students were required to participate in all of the activities. There were four to six members in each group and the group memberships were randomly determined for each topic. In face-to-face classes, learning activities were mainly done individually and between the regular face-to-face classes, students worked in groups. Each discussion lasted two weeks, and in the middle of two weeks, one face-to-face instruction was inserted to give some intervention and facilitation from the instructor.

## Instruments

The CoI survey and the questionnaire were conducted at the end of the semester. Students' CoI level, learning behavior, satisfaction and contributions to the asynchronous discussion activities, and English proficiency were measured. The CoI survey, according to Swan, Richardson, Garrison, Cleveland-Innes, M., & Arbaugh (2008), which consisted of 34-five-point Likert scales, and the internal consistencies were reported with Cronbach's alpha as 0.94 for Teaching Presence (TP), 0.91 for Social Presence (SP), and 0.95 for Cognitive Presence (CP) (Swan et al., 2008).

To determine the learning behavior, the total number of student comments was counted to identify how active each student was during the asynchronous discussion for the primary quantitative analysis. The students' comments were qualitatively focused to investigate the quality of the interaction.

The questionnaire was used to collect students' satisfaction ratings and their perception about their own contribution to the community. The student satisfaction was gathered using a 4-point Likert scale, with 1 meaning not satisfied at all and 4 meaning very satisfied. The contribution rate was an average percentage of each student's perspective contribution to the community (i.e., group), while assuming that the total effort of all members in a group was 100%.

Students' English abilities were measured with a standardized test, TOEIC® IP (Institutional Program), developed and provided by Educational Testing Service (ETS). There were two parts to the test, listening and reading, and its final score ranges from 10 to 990. TOEIC-IP scores are not official, but they are as reliable as the original TOEIC scores. The TOEIC-IP score was employed partially for the final grading of the course. Taking TOEIC-IP was an essential requirement for course credit, and all registered students should have taken the test one month prior to the end of the semester. The students' total scores were utilized to analyze the relationship between English ability and CoI.

The interactions and CoI relationship were evaluated, and students' comments of the discussion activities were encoded with the indicators of CoI (Garrison, 2011). The instructor provided most of the feedback and intervention when she met students in the classroom. The SP and CP of the CoI provided the focus on asynchronous communication in this research. There were three categories with 12 indicators for SP, and four indicators for CP were adopted for encoding. To increase credibility, the authors discussed the inconsistent encodings and came to the agreements for all comments. Garrison, Cleveland-Innes, Koole, and Kappelman (2006) claimed the importance of the unit of analysis for coding of CoI. For many years in the twentieth century, researchers used the sentence as a unit of analysis (Harre, 2001). Sentences were employed as a unit of analysis, because the comments indicated more information. However, the level of detail made encoding procedures more complicated and interpretation much more difficult.

## Data Analyses

There were two major analyses required for the research purposes. MANOVA was utilized as the primary statistical procedure for the first four research purposes related to students' CoI level: learning behavior, satisfaction, contributions to the asynchronous discussion activities, and English proficiency. The MANOVA analysis allows researchers to test the simultaneous differences among groups of multiple variables (Cohen, Cohen, West, & Aiken, 2003). MANOVA also controls the inflation of experiment-wise Type I and Type II errors. The independent variable (IV) was the CoI level, and the dependent variables (DV) were the number of discussion comments, the students' satisfaction, the students' contribution, and TOEIC. To consider students' characteristics, the score of three presences (teaching, social, and cognitive) were categorized into three level, High  $\geq 3.5$ ,  $3.5 < \text{Medium} < 2.5$ , and Low  $< 2.5$ . The combination patterns were used for the primary data analysis. There were 27 ( $3 \times 3 \times 3$ ) patterns available, because there were three levels for the three presences. Once the overall MANOVA was significant, then the IV and each DV

would be tested individually. To get more detailed information about the relationships between the CoI level and DVs, the correlation matrices were discussed.

Each ratio of the sentences of students' comments after coding based on the indicators for the SP and CP is provided. As in the CoI mode (Garrison, 2011), SP and CP are factors that support discourse. Thus, SP and CP are used to investigate the quality of the students' interactions in this research.

## Results

Relationships between the CoI and (1) Learning Activity, (2) Satisfaction, (3) Contribution, and (4) TOEIC.

Descriptive statistics.

The descriptive statistics of the discussion comment numbers and satisfaction and contribution variables are shown in Table 2 and Table 3 respectively. The total number of the comments through five discussions was 545, and the total number of the sentences was 922. The average number of sentences for each question was 1.69, with about 6.2 words per sentence. Table 3 reports that the average score on the discussion satisfaction is 2.95, the average contribution is 35.49%, and the average TOEIC score is 449.88 with the range of 315 to 620.

Table 2. Discussion Comments, Sentence, and Word counts

Table 3. Descriptive Statistics Results for the Dependent Variables of Discussion Satisfaction and Contribution

The results of the descriptive statistics for the TP, SP, CP from the CoI survey are provided in Table 4, 5, and 6. As Table 4 shown, the TP of the students was relatively high with the grand mean from all three categories of TP at 3.98. The category of "design and organization" scored highest among the three ( $M = 4.38$ ) and the "direct instruction" scored lowest ( $M = 3.72$ ). Question items 3 and 4 marked highest with  $M = 4.45$ . Most students thought that the instructor provided adequate details about how to participate in the research and what the due dates/time frames were for the course's learning activities.

Table 4. CoI Descriptive Statistics: Teaching Presence (TP)

The SP in Table 5 scored slightly lower than the TP with the grand mean of 3.73. There were three categories, affective expression, open communication, and group cohesion, in the "social presence" statistics. The highest average was the "affective expression" ( $M = 3.84$ ), followed by "open communication" ( $M = 3.76$ ). Survey item 16, "Online or web-based communication is an excellent medium for social interaction" had the highest mean at  $M = 3.98$ . The high mean implies that most students have positive impressions of CMC.

Table 5. CoI Descriptive Statistics: Social Presence (SP)

Table 6 provides the results of the CP descriptive results. The grand mean for the CP was 3.61 and this was the lowest among three presences of CoI. The highest average was survey item 28 ( $M = 4.26$ ), while the lowest was item 26 ( $M = 2.95$ ). From these results, students might appreciate the diverse perspectives achieved through the asynchronous online discussion, but they might regret that they did not use various information sources for the discussion problems.

Table 6. CoI Descriptive Statistics: Cognitive Presence (CP)

The seven types with the combination of the three levels for three presences are summarized in Table 7. Forty-two students were categorized into seven types over 27 types. There were 19 students (45.24%) with high TP, high SP, and high CP levels (H-H-H), and only four students (9.52%) had all low levels (L-L-L). Only one student had a high TP, low SP, medium CP (H-L-M) type. The highest number of discussions posted by one student was 17, and this student had a high TP, low SP, and medium CP. The lowest average comment number was 7.5, and both students had high TP, Low SP and a low CP in their CoI.

The average of the discussion satisfaction was 2.95, and most students chose between 3 and 4 for their satisfaction levels. The H-L-M student and the students with low TP averaged less than 3 in the satisfaction level. As to the discussion contribution, the L-L-L students averaged the lowest at 17.5%. The highest contribution of 46.71% was claimed by the H-H-L type.

When the CoI types and TOEIC were compared, the H-L-M student scored the lowest at 315 on the TOEIC. Other types averaged over 400. The interesting thing is that TOEIC average score of the L-L-L type was the highest at 488.75.

Table 7. Descriptive Statistics Results of Seven types of CoI

Note. <sup>a</sup>TP: Teaching Presence, SP: Social Presence, CP: Cognitive Presence. <sup>b</sup>H: The average is equal to or greater than 3.5, M: The average is less than 3.5 and equal to or greater than 2.5. L: The average is less than 2.5.

Student CoI types and dependent variables.

The results of ANOVA were statistically significant, Wilks' Lamda = .355,  $F(24, 113) = 1.63$ ,  $p < .05$ . This implies that when all dependent variables are considered simultaneously, the CoI types had a significant correlation. Table 8 illustrates the significance that was found in the discussion comment number and the CoI types as the results of ANOVA. However, the Tukey's HSD did not show significance between any groups. The possible reason might be that very few cases in several types made the analysis difficult. For example, there was only one case for the H-L-M type. The Fisher's LSD, which was said less rigorous in the statistic test, was conducted just for our reference. When alpha was set to .05, the H-H-H type had significant difference from the H-L-M, H-L-L, and L-L-L, and the H-H-L was significantly different from the H-L-L and L-L-L. The results suggest that there were

different tendencies concerning the number of discussion comments between the higher and the lower CoI types, especially the high TP and high SP combination, which might produce more comments compared to other combinations.

#### Table 8. ANOVA Results

Three presences of CoI and dependent variables.

So far, student characteristics were focused on examining the relationships between the CoI and the dependent variables. Next, each presence of the CoI would be explored. Table 9 provides the correlation matrix of the CoI and the targeted dependent variables. From the perspectives of the presences, the SP and the discussion comment number have a significant relationship ( $r = .483$ ,  $p < .01$ ), and the TP and CP have significant relationships with the satisfaction (TP:  $r = .347$ , SP:  $r = .313$ ,  $p < .05$ ). No significant correlation was observed between any of the presences and TOEIC. Through a comparison of the subcategories of each presence: teaching, social and cognitive, and the DVs, the category, design, and organization, it is evident that TP has significant correlation with the satisfaction and the contribution, and its facilitation category is significantly related to satisfaction. The “affective expression” ( $r = .363$ ), “open communication” ( $r = .436$ ), and “group cohesion” ( $r = .357$ ) categories in SP relate to the comment number significantly. The open communication also shows significance in its relationship to the contribution ( $r = .350$ ). In the CP, only the triggering event category was significant in its correlation with the satisfaction.

#### Table 9. Correlation Matrix of CoI and Dependent Variables

Note. \*  $p < .05$ , \*\*  $p < .01$ .

Table 10 illustrates the correlation matrix between the 34 survey items and the dependent variables. When the focus is on the discussion comment number, the CoI survey item 19, “I felt comfortable interacting with other course participants,” has a strongest positive correlation, and it is statistically significant ( $r = .47$ ,  $p < .01$ ). The survey items 14 “Getting to know other course participants gave me a sense of belonging in the course,” 18 “I felt comfortable participating in the course discussions,” 22 “Online discussions help me to develop a sense of collaboration,” and 23 “Problems posed increased my interest in course issues,” are also significantly related to the number of comments. Except for the item 23, all are in the SP.

#### Table 10. Correlation between the CoI Survey Items and the Dependent Variables

With regard to the satisfaction, survey item 2 “The instructor clearly communicated important course goals,” is significantly related with ( $r = .42$ ,  $p < .01$ ). Item 3 “The instructor provided clear instructions on how to participate in course learning activities,” 4 “The instructor clearly communicated important due dates/time frames for learning activities,” and 10 “Instructor actions reinforced the

development of a sense of community among course participants” of TP, along with item 16 “Online or web-based communication is an excellent medium for social interaction” of SP, and item 25 “I felt motivated to explore content related questions” of CP have significant relationship with the satisfaction.

Table 10 illustrates that the dependent variables, the satisfaction, and the contribution are significantly related to each other with  $r = .45$ . The CP is significantly correlated with survey item 2 “The instructor clearly communicated important course goals” of TP, items 18 “I felt comfortable participating in the course discussions” and 19 “I felt comfortable interacting with other course participants,” of SP, and items 23 “Problems posed increased my interest in course issues,” and 30 “Learning activities helped me construct explanations/solutions” of CP. TOEIC is negatively correlated with survey item 15 with slight significance ( $r = -.34$ ,  $p < .05$ ).

### Students’ Interactions and Social/Cognitive Presences

The results of the relationship between student interactions during asynchronous discussion and the CoI’s SP and CP are presented in order to test the fifth research purpose, which is to investigate the learners’ interactions during the discussion in terms of the CoI. Each sentence of students’ comments during the discussion was coded according to the CoI’s SP and CP indicators and the percentages of each indicator for the total number of sentences is 100 % in Table 11 and Table 12 respectively.

The affective expression indicator is defined as “conventional expressions of emotion, or unconventional expressions of emotion, including repetitious punctuation, conspicuous capitalization, and emoticons,” according to Garrison (2011). This indicator was counted when a sentence implied respect and welcome with informal expression, such as emoticons and capitalization. In Discussions 1, 2, and 5, the indicator of “affective expression” in interpersonal communication of SP illustrates a relatively higher percentage, more than 10%. In Discussions 1, 2, and 3, the indicator of “expressing agreement” in “open communication” of SP shows more than 10%. In the “cohesive communication” category, where cohesive communication means addressing the group using inclusive pronouns, such as we, us, our, the group show around 15 % of all of the sentences written for the discussions 2, 3, and 4.

The SP indicator ratio to number of sentences seems to differ according to the discussion problems. On the other hand, the CP indicator counts seem stable, regardless of the discussion problems. The indicator “exploration” offers higher percentages for the total number of the sentences. Unfortunately, there were no sentences coding into the “committed” indicator.

Table 11. Percentage of Indicators for Social Presence against Total Number of Sentences

Table 12. Percentage of Indicators for Cognitive Presence against Total Number of Sentences

## RELATIONSHIPS AMONG COI AND EFL LEARNING

This section will discuss the characteristics necessary for designing CSCL for EFL learners based on the results of the case study. The discussion will be organized according to the five research purposes.

### Suggestions on CSCL Design for EFL Learning

#### Learning Behavior during Online Discussion.

An asynchronous discussion setting of CSCL is beneficial for EFL learners, because it gives students more opportunities to use and practice English. In this context, it is essential to reveal some methods to increase students' expressions during the discussion. The results in Table 7 and ANOVA suggest that higher CoI levels might have a positive relationship with the number of student comments in the discussions. The higher CoI, especially of TP and SP, a student has, the more s/he may post comments during the discussion. The results of the learning behavior and CoI in Table 9 illustrate that social presence is a key element for students' producing more statements. In addition to encouraging students to form affective expression and group cohesion in a learning community, the establishment of open communication is crucial. High TP and high SP combinations also increase the number of posting to the discussion.

#### Discussion Satisfaction.

The results in Table 9 show that the discussion satisfaction is significantly correlated with TP and CP. The design, organization, and facilitation categories have stronger positive relationship with the satisfaction in TP. This implies that when the study is well-designed and the students perceived clear instruction of the course goals and learning activities, the students tend to be satisfied with the design and organization. When the students felt that their instructor help them form the sense of community, they were satisfied with the asynchronous discussion. This supports the results of Garrison and Cleveland-Innes (2005), which emphasized structure and leadership for higher-order learning. The structure indicates design, and leadership refers to the facilitation of the study and the direct instruction category in the CoI survey.

CoI survey item 25 in the "triggering event" category of CP is also significantly related to student satisfaction. This implies that when students felt motivated to explore the related content, they showed higher satisfaction. When students are interested in a discussion topic and eager to seek more information, they might feel more satisfied after the discussion.

Table 9 does not show a significant relationship between the satisfaction and SP, but the individual variable correlation matrix in Table 10 shows the significance between CoI survey item 16 in SP and satisfaction, which indicates a positive attitude toward and acceptance of technology as a social communication tool. To increase student satisfaction with the online discussions, helping them create positive attitudes toward web-based communication might be considered when the CSCL is designed.

### Discussion Contribution.

As a member of the learning community, contributions of each member are important factors for the enlivenment of the community. The community of inquiry benefits tremendously from diversity and the perspectives of the members. How to extract contributions of the community members is one of the most significant issues in learning-community studies. Overall scores of three presences of CoI, TP, SP and CP, have no relationship with the contribution in Table 9. However, when viewing the individual survey items, survey item 2 in TP and item 19 a have relatively higher relationship with contribution. This may imply that some subcategories of each presence independently relates to contribution. In such a case, the design and organization in TP and the open communication in SP should be important in increasing the students' perceptions of their contributions to the community. In other words, when we design CSCL with students' high contributions, it seems influential to set clear course or activity goals and prepare a comfortable learning environment for their interactions.

### TOEIC.

Students in the case study have been learning English as a foreign language. Language proficiency was thought to play a critical role in an asynchronous discussion before this research was conducted. However, based on the results, TOEIC was not related to the CoI or any other dependent variables. Therefore, other factors might be more influential than English proficiency on students' learning activities, satisfaction, and contribution. The effects of the learning activities were not the focus of the research. If the learning outcomes and learning process are the focus in the future, language proficiency might have an effect on the results.

### Interactions for EFL Learning.

The sentences of the students' comments are analyzed in terms of the SP and CP. Focus on the SP, at the beginning of the learning activities (i.e., Discussion 1), where self-disclosure marks are 12.1%, while in other discussions less than 10% of sentences show this indicator. This result is consistent with the previous research. According to Brown (2001), SP becomes transparent as the focus shifts to academic purposes and activities.

The ratio of the "affective expression" in the interpersonal expression and the "expressing agreement" in open communication might change according to discussion topics. As shown in Table 1, discussion topics 1, 2, and 5 seem to obtain students' interests. This issue may be related to survey item 23 "Problems posed increased my interest in course issues," although the item is included in "triggering event" in the CP. Item 23 has significant correlation with the comment number, satisfaction, and the contribution. Setting proper problems appears to be essential when designing a productive learning environment for EFL learners if the researcher wants to increase student comments. SP, including the "affective expression" indicator, has a direct effect on climate and open communication.

The “expressing agreement” indicator is included in the open communication category of the SP. Garrison (2011) claims that expressing agreement “reveals engagement in the process of critical reflection and discourse.” Open communication plays an important role in reflective e-learning community of inquiry. According to Table 11, discussions 4 and 5 might not give students many opportunities for reflection and insight.

From the perspectives of the CP, the nature of the discussion problems that did not require the student’s application, test, or defense, had no count on the “committed” indicator. Most discussion problems asked students to brainstorm their own ideas and then find an answer as a group. These answers were matched to the indicators “triggering event (evocative)” and “exploration (inquisitive).” Then, only few groups in Discussion 1, 2, and 5 reached an agreement at the end of the discussion. This lack of agreement explains why the “integration (tentative)” ratio is smaller.

The discussion problem might directly affect the students’ comments and interactions. When “affective expression” in SP increases too much, the research illustrates that more irrelative expressions, which are not directly related to the discussion topics, may increase and meaningful interactions in CP directly related to the discussion topic may decrease. If this is the case, it is important to maintain an appropriate level of SP for meaningful interactions in CP. This result is similar to the relationship between anxiety, performance, and effective classroom climate. A small amount of anxiety may improve performance (Shipman & Shipman, 1985), which is often called “facilitating anxiety.” An open and positive classroom atmosphere is fundamental for quality interactions led to learning, but a little businesslike atmosphere should be also kept for effective learning and the accomplishment of the learning goals (Davis & Thomas, 1989).

According to our observation, once students established open communication in SP, then they start to concentrate on the discussion topics. The SP and CP indicator ratio to the number of sentences provided by the students might not simply shift over time, which slightly disagrees with Swan (2003) who suggests the shifts of SP over time in online discussion will occur. The result emphasizes the importance of encouraging students maintain an appropriate level of SP and focus on academic purposes as Brown (2001) suggests. To help students focus on academics, instructors prepare authentic and slightly challenging topics that will require higher content knowledge and cognitive skills.

### Limitation of the Study and Future Research Implications

There are several limitations of the study. First, more case studies with a variety of settings should be investigated. Garrison and Arbaugh (2007) point out that more empirical evidence is needed to validate the CoI model as a framework for online learning. EFL learning is affected by culture, mother tongue, societies, etc. Community of inquiry should be examined among not only Japanese but other nationalities. Settings among mixed nationalities and international settings should be considered to reveal greater support of CSCL for EFL learning. A longitudinal

study, where observations occur over a certain period of time, is also required. Longitudinal studies could provide us with significant information on how students learn and acquire their language skills.

Blended learning was employed in this study. Most of the facilitations and direct instructions were conducted during the face-to-face classes. Other setting, such as a full online course and other types of blended learning, should be examined in future research.

As to quality interactions, SP and CP were the focus of this study. TP should be also included in the future research. Strategies of discourse analysis should be reconsidered in the future also. In this research, each sentence was coded and used as a unit of analysis. The validity of using sentences as the unit of analysis should be discussed further. Compared to the indicators of SP for coding, those of CP are rough, and it may be difficult to obtain detailed information on student interactions.

Discourse analysis is emerging from different academic disciplines, including linguistics, cognitive psychology, and social psychology and so on. The definitions of discourse fall into the three main categories, (1) anything beyond the sentence, (2) language use, and (3) a broader range of social practice, according to Schiffrin, Tannen, and Hamilton (2001). For further investigation of the interactions and communication during learning activities, the perspectives of discourse analysis can be applied for both EFL learning and collaborative learning.

## CONCLUSION

Garrison (2011) introduces that design and organization, facilitating discourse, and direct instruction in TP could support a set climate and monitor and regulate learning that is incorporated with SP and CP. The SP and CP cooperation could also affect the quality of interactions, and all three presences produce educational experiences in the CoI model. Based on the cased study introduced in this chapter, the following is a summary of suggestions to apply the CoI to design CSCL, especially with regard to asynchronous discussion for EFL learning.

- Support open communication to increase the number of student comments during a discussion, which is the preferred learning behavior in CSCL.
- Evaluate TP and CP during design and implementation to encourage student satisfaction with the asynchronous discussion
- Consider the design and organization of TP and open communication of SP to gain student contributions.
- Use CSCL activities to help students at all proficiency levels to practice English, because CSCL might not depend too highly on students' EFL proficiency.
- Help students establish SP first and then shift their focus to academic topics to increase the quality of student interactions during the learning activities.

The careful design of a learning community, including appropriate problem setting, seems to be the most important when we apply the CoI to CSCL for EFL

learners. In order to create an effective and attractive of learning activities, perspectives of instructional design could be merged into the CoI model.

This course was designed and implemented based on the Collaborative Problem Solving (CPS) approach (Nelson, 1999) in the instructional design (ID) and Teaching and Learning Guideline in CoI (Garrison, 2011). The CPS approach consists of two categories, (a) comprehensive guideline and (b) process activities. The comprehensive guideline defines the major role of teachers, the activities of learners, and the process activities to provide detailed procedures of collaborative learning with strategies that both teachers and learners can use. The CoI guideline indicates specific actions of teachers according to the plan (design and organization) and implementation (facilitation, and direct instruction) phases. The social presence and cognitive presence of CoI seem convenient and useful for teachers to plan and implement collaborative learning, considering the important factors affecting online learning. To design CSCL, combinations of those two approaches, instructional design and CoI, could empower higher-order learning through collaboration in a learning community where the CPS is used to form the structure of collaborative learning and CoI uses online communication for quality interactions. In order to improve education and learning with technology, further research is required to address the study's limitations.

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