Bull. Hiroshima Inst. Tech. Education Vol.16（2017）1-9

Article

The Mediating Role of Cognitive and Social Presence on the Relationship between Perceived Interaction and Satisfaction in CSCL

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（Received Oct. 15, 2016）

Abstract

Cognitive presence and social presence and interaction are important factors of learning of CSCL. This study examines the learning process of two types of CMC: text chat and video chat. Japanese and Philippine EFL learners at the college level participated in this study. We attempted to determine how much each mode of communication impacts learning and how each application may affect language production by NNs as well as whether cognitive and social presence may stimulate both NNs within the two modes. More specifically, the effects of cognitive and social presence on the relationship among interaction and satisfaction were explored.

The results reveal that for text chat, cognitive presence is closely related to learning and satisfaction, whereas for video chat, the degree of social presence may be mitigated among Japanese participants, and peer interaction is a more influential predictor of student satisfaction and learning.

Key Words: CSCL, Cognitive presence, Social presence, Interaction, Satisfaction

1. Introduction

Computer-supported collaborative learning (CSCL) offers many opportunities to improve the efficacy of English as a foreign language (EFL) environments. It is now widely understood that interaction plays a key role in the process of second language (L2) learning (Long, 1985). Text chat aids learners as they develop grammatical and lexical accuracy in a new language (Yamada & Akahori, 2007), and makes it easier for learners to communicate emotions via special characters called emoticons (Gunawardena & Zittle, 1997). Videoconferencing reduces physical barriers while at the same time encouraging learners to use the target language (McAndrew et al., 1996). It also enables learners to deploy non-verbal communication strategies, including facial expression and gestures (Bruce, 1996). Yu, She, and Lee (2010) found that students in computer-supported environments improved learning outcomes and retained more of what they had learned than students in lecture/discussion environments. Computer-supported collaborative learning (CSCL) is a pedagogical framework whereby learning occurs through social interaction by means of a computer. The relevance of collaboration in CSCL can be traced to Vygotsky's social learning theory, which holds that peers are able to teach each other, and students who have mastered a skill can support other students to achieve learning outcomes. Lipman (1991) was influenced by Vygotsky's social model of cognitive development, which is the foundation of his Community of Inquiry model (CoI). This concept holds that children's cognitive abilities develop through interaction with peers. The CoI framework considers three dimensions or presences: teaching, social, and cognitive (Garrison, Anderson, & Archer, 2001).

'Social presence' is a term used to refer to learners' perception of their sense of connection with learners and communities throughout the learning process. Gunawardena (1995) define it as "the degree to which a person is perceived as 'real' in mediated communication" (p. 151). Social presence has been studied for its role in online

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learning experiences.

The social presence of instructors is an aspect of "teaching presence" (Anderson, et. al., 2001; Shea, Pickett & Pelz, 2003). Anderson, Rourke, Garrison, and Archer (2001) defined teaching presence as design and organization, facilitated discourse, and direct instruction. Teaching presence has been shown to be important in relation to student satisfaction (Garrison & Arbaugh, 2007).

More recently, Mayne and Wu (2011) found that social presence techniques used by instructors could affect student social presence and group interaction significantly. Swan and Shih (2005) found that instructor presence may be just as important as peer presence; however, the two constructs may sometimes overlap. Peer interactions may compensate for inadequate interaction with instructors. There is a need for further investigation of these constructs and how they interact.

Cognitive presence refers to students' perception of their own understanding of the content they have learned. It includes their awareness of the relevant information they have collected and the efforts they put into learning activities or assignments (Wang & Kang, 2006), which are considered important elements for positive learning outcomes (Kanuka & Garrison, 2004).

Cross-cultural studies have been of great interest to CMC researchers as well because of the disparate ways people communicate across cultures and even across organizations (Hofstede, 1994).

More specifically, the effects of cognitive and social presence on the complex and overlapping relationships between interaction, learning outcomes, and satisfaction need to be explored in cross-cultural studies, with different communication modes as a variable.

This study attempts to fill this gap in the body of research on the use in English language learning by means of CSCL. This study focuses on communication among and between Japanese EFL learners and Philippine EFL learners, investigating whether perceived interaction, cognitive presence, and social presence predict or influence the outcome of two types of CSCL: text chat and video chat.

2. Literature Review

In the following section we review the existing literature related to the issues outlined above.

2.1 Cognitive presence and Learning outcomes

Kanuka, Rourke, and Laflamme (2007) reported that cognitive presence is composed of concepts spread across a wide spectrum of inquiry. These elements include triggering events, exploration, integration, and resolution. Garrison (2003) insisted that cognitive presence facilitates deeper, more effective learning. Critical thinking skills may be enhanced through cognitive presence. Cognitive presence is an important element for higher-order thinking (Kanuka & Garrison, 2004), and one recent study of online learning have found a positive correlation between cognitive presence and learning outcomes, such as satisfaction and achievement (Kang, 2005). If learners develop ways to move themselves and others toward higher levels of cognitive processing, better performance and greater satisfaction may be the result.

2.2 Social Presence and Learning outcomes

Social presence is a factor of both the medium and the communicators' perceptions of presence in a sequence of interactions (Gunawardena & Zittle, 1997). Social presence has been identified as a predicting variable for positive learning outcomes in CSCL (Wang & Kang, 2006). Its significance is reported in the advanced studies of Richardson and Swan (2003), Swan and Shih (2005), and Jo and Han (2010). Richardson and Swan (2003) found students' perceived social presence and its relationship to their perceived learning and satisfaction with course instructors were all highly correlated. Cobb (2011) also reported a high correlation between social presence and satisfaction. Therefore, we assumed that if the participants in this study felt comfortable conversing through an online medium, they would be willing to participate in another online course, thus leading to better working relationships, and they will enjoy learning English through this online activity.

2.3 Social Presence and Interaction

Several empirical studies have found that a high level of interaction can motivate high social presence (Swan, 2003). Perceived interaction in these studies positively

correlated with social presence. Interaction is one of the essential variables in CSCL, which focuses on the students' experience. It can be linked to increased learning achievement (Chang & Smith, 2008). Short, Williams, and Christie (1976) claimed that social presence "varies among different media, and it affects the nature of the interaction." Studies on the influence of perceived interaction for each mode in a CSCL environment are needed. We believe that the higher the sum of individual interactions, the higher the social presence, and thus the higher learner's achievement will be.

2.4 Teaching presence and Interaction

Garrison, et. al. (2000) claimed that while interactions between participants are necessary in virtual learning environments, interactions themselves are insufficient to guarantee positive learning outcomes. Teaching presence has been shown to be important in the satisfaction and success in explicitly educational communities (Garrison & Arbaugh, 2007). Teaching presence consists of three areas of responsibility: design, facilitation, and direct instruction. Zhoa, Lei, and Tan (2005) reported that the degree of instructor involvement in content delivery and interaction with students was crucial for effective distance education. More research is needed to determine the impact of peer social behavior in CSCL, considering that peer interactions can compensate for insufficient teacher interaction, especially when pair work is conducted in a CSCL environment. We examined if learners who described their partner involvement and support as helpful in their online course would experience greater satisfaction, and what affect such satisfaction might have on communication and performance.

Research Questions

This study attempts to fill this gap in the body of knowledge on the use in English language learning in CSCL environments among Japanese EFL learners versus Philippine EFL learners. We conducted an integrated analysis of major predicting variables for the outcomes of two types of CSCL: text chat and video chat. Specifically, we investigated the following questions:

1. Do social presence, teaching presence, cognitive presence, and interaction predict the outcome of CSCL satisfaction within each mode of CSCL communication?
2. To what extent does cognitive presence mediate the relationship between perceived interaction and learning outcomes (satisfaction) within each mode of CSCL communication?
3. To what extent does social presence mediate the relationship between perceived interaction and learning outcomes (satisfaction) within two modes in CSCL?

3. Methodology

3.1 Participants and Procedure

To test our hypotheses, we recruited volunteer groups of 57 Japanese intermediate EFL university students (TOEIC 380 to 550) and 55 EFL Philippine university students in the fall of 2014. Their age ranged from 18 to 20.

Process variables were social presence, teaching presence, and cognitive presence; outcome variables were interaction and satisfaction. More specifically the effects of cognitive and social presence on the relationship between either interaction, or satisfaction are explored. We attempt to determine how much each mode of communication impacts learning and how each application may affect language production and interaction among NNs as well as whether cognitive and social presence may stimulate both groups of NNs within each mode.

Table 1. *Participants*

Japanese	57	Text chat	30
		Video chat	27
Philippino	55	Text chat	29
		Video chat	26

3.2 Measurement

Three survey instruments were used in this study to measure teaching presence and social presence (peer), and cognitive presence as measured by Arbaugh, et al. (2008), Satisfaction Scale (Gunawardena & Zittle, 1997), and the perceived interaction scale developed by Fulford and Zhang (1993). Responses were scored using the scale (1 = Strongly Disagree) to (5 = Strongly Agree).

Cronbach's Alpha yielded numbers indicative of high inter-correlations leading to internal consistencies: 0.94 for Teaching Presence, 0.85 for Social Presence, 0.89 for Cognitive Presence, 0.84 for Perceived Interaction, 0.85 for Satisfaction, which indicates that the instruments used

in this study provide a reliable measure for the existence of a community of inquiry in online learning environments.

3.3 Procedure

Japanese participants were paired with a Philippine students and then divided into text chat and video chat groups. All pairs used Skype as a platform to connect to each other for 30 minutes per session to discuss a given theme. The weekly topics were provided as a general guide for open discussion. We provided some question items related to the theme beforehand to prompt more active discussion. Students spent 30 minutes in discussion on the assigned tasks, with only the mode of discussion differing (i.e., text chat, or video chat). Data created by pairs in each mode accumulated on the Moodle (LMS). Teachers both in Japan and in the Philippines set goals, made instructional design, gave direct instruction, and provided technical support during students' exchanges.

4. Results

4.1 Means and Standard Deviations for Each Scale

The mean standard deviation was evaluated for each scale. The descriptive statistics are presented in Table 2. The maximum score possible for each item was five. As Table 2 illustrates, the overall mean for each scale was higher for all video chat group than for all text chat groups, while the overall mean of Philippine learners was higher than that of all Japanese learners. In particular, the overall means for perceived satisfaction, and perceived interaction were higher for video chat groups than for the text chat groups; while especially, social presence, cognitive presence, and satisfaction were much higher for Philippine learners than for Japanese learners.

4.2 Correlation Analysis

In advance, a Pearson correlation analysis was conducted to examine the relationships among the variables (social presence, teaching presence, cognitive presence, satisfaction, and interaction) in each mode.

As indicated in Table 3, the higher correlation was found between cognitive presence and interaction (r = .728, p < .05) in text chat groups. Moreover, a significant positive relationship was also found between interaction and satisfaction (r = .651, p < .05) and between cognitive presence and satisfaction (r = .655 p < .05). The correlation was moderate between some of the other variables (r between .400 and .600, all p < .05). As indicated in Table 4, the highest correlation for video chat groups was found between interaction and satisfaction (r = .708, p < .05), and a strong positive relationship was also found between social presence and satisfaction (r = .645, p < .05).

Table 2. *Means and Standard Deviations for Each Scale*

	JPN		PHL		Text		Video	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*
Social Presence	3.60	0.42	4.03	0.59	3.79	0.57	3.83	0.54
Teaching Presence	3.50	0.66	4.07	0.62	3.68	0.74	3.88	0.64
Coginitive Presence	3.66	0.40	4.06	0.61	3.85	0.51	3.87	0.59
Interaction	3.90	0.41	4.17	0.67	3.95	0.53	4.12	0.59
Satisfaction	3.80	0.41	4.12	0.49	3.90	0.45	4.02	0.50

Table 3. *Correlation Analysis for Text Chat Groups (n = 59)*

	Mean (*SD*)	Social Presence	Teaching Presence	Coginitive Presence	Interaction	Satisfaction
Social Presence	34.05 (5.11)	-				
Teaching Presence	41.03 (7.93)	.408**	-			
Coginitive Presence	42.71 (5.61)	.448**	.521**	-		
Interaction	19.61 (2.61)	.485**	.496**	.728**	-	
Satisfaction	35.07 (3.90)	.522**	.390**	.655**	.651**	-

*p < .05 **p < .01

4.3 Analysis of Predictor Variables for Satisfaction

Identifying which variables predict satisfaction in text chat groups, multiple regression analysis was implemented, assigning social presence, teaching presence, interaction, and cognitive presence as predictor variables, and satisfaction as a criterion variable (see Table 5). According to the results, cognitive presence ($\beta = .350$, $p < .05$) was found to significantly predict satisfaction (F (5, 53) = 12.513, $p < .001$), and predicted 35.0 % of the variance in satisfaction ($p = .02$); their explanatory power was approximately 53.3% (adj. $R^2 = .498$). Social presence was significant predictors of satisfaction ($p = .037$), indicating that social presence explained approximately 23.4% of the variance in satisfaction.

On the other hand, to identify which variables predict satisfaction in video chat groups, a multi-regression analysis was used setting social presence, teaching presence, interaction and cognitive presence as predictor variables while satisfaction was a criterion variable (see Table 6). As a result, social presence ($\beta = .350$, $p < .05$) was found to significantly predict satisfaction (F (5, 45) = 15.692, $p < .001$), indicating that social presence explained approximately 35.0 % of the variance in satisfaction; their explanatory power was approximately 62.9% (adj. R^2 =

Table 4. *Correlation Analysis for Video Chat Groups (n = 53)*

	Mean (*SD*)	Social Presence	Teaching Presence	Coginitive Presence	Interaction	Satisfaction
Social Presence	34.50 (4.93)	-				
Teaching Presence	42.40 (7.33)	.547**	-			
Coginitive Presence	42.48 (6.69)	.326*	.350*	-		
Interaction	20.73 (3.02)	.477**	.322*	.500**	-	
Satisfaction	36.08 (4.68)	.645**	.432**	.490**	.708**	-

*$p < .05$ **$p < .01$

Table 5. *Regression Analysis of Satisfaction for Text Chat Groups (n = 59)*

Sec.	Predictor Variables	Criterion Variables	*B*	*SE*	*β*	*t*	*p*	*F*	R^2 (adj. R^2)
Variables entered	Social presence	Satisfaction	.179	.084	.234	2.133	.037*	15.384**	.533 (.498)
	Teaching presence		-.019	.056	-.038	-.333	.740		
	Cognitive presence		.243	.098	.350	2.473*	.017*		
	Interaction		.450	.212	.301	2.122	.038*		

*$p < .05$ **$p < .01$

Table 6. *Regression Analysis of Satisfaction for Video Chat Groups (n = 53)*

Sec.	Predictor Variables	Criterion Variables	*B*	*SE*	*β*	*t*	*p*	*F*	R^2 (adj. R^2)
Variables entered	Social presence	Satisfaction	.329	.110	.350	1.355	.004**	19.515**	.629 (.597)
	Teaching presence		.019	.070	.030	.269	.789		
	Cognitive presence		.098	.076	.137	1.293	.202		
	Interaction		.716	.175	.457	4.100	.000**		

*$p < .05$ **$p < .01$

.597).

Interaction (β = .457, p < .01) was found to significantly predict satisfaction (F (5, 45) = 15.692, p < .001); its explanatory power was approximately 62.9% (adj. R^2 = .597). However, cognitive presence was not found to significantly predict satisfaction (p = .202), and explained only 13.7% of the variance in satisfaction.

4.4 Verification of Mediating Effects of Social Presence Between Interaction and Satisfaction

As in previous studies that found a positive correlation between students' perceptions of course-related interaction and their course satisfaction (Chang & Smith, 2008; Swan, 2002), we have seen (Table 3), a significant positive relationship between interaction and satisfaction in text chat groups. In addition, cognitive presence was found to significantly predict satisfaction (see Table 5). Therefore, in order to test our predictions regarding the mediating effects of cognitive on satisfaction and interaction, we conducted Structural Equation Modeling (SEM) to develop a model that represents the relationships among interaction, satisfaction, and cognitive presence (see Figure 1). To test our predictions regarding the effects of satisfaction we specified the model in Figure 1. Lastly, the model showed an adequate goodness of fit: GFI = 1.00, AGFI = 0.92, RMSEA = 0.05. Figure 1 shows a model having the cognitive presence as a mediator between interaction and satisfaction. Utilizing standardized data, the indirect effect of interaction on satisfaction (.28) via cognitive presence, was lower than the direct effect of interaction (.38) on satisfaction.

This means that cognitive presence has a mediating effect on interaction and satisfaction, and that interaction was weakly related to satisfaction through their effect on cognitive presence.

As we have seen (Table 6), social presence was found to significantly predict satisfaction in video chat groups. In order to test our predictions regarding the mediating effects of social presence on interaction and satisfaction, Structural Equation Modeling (SEM) was used to develop a model that represents the relationships among Interaction, satisfaction, and social presence (see Figure 2).

To test our predictions regarding the mediating effects of social presence, we specified the model in Figure 2. The model showed an adequate goodness of fit: GFI = 1.00, AGFI = 0.91, RMSEA = 0.04. Figure 2 shows a model with social presence as a mediator between interaction and satisfaction. Utilizing standardized data, interaction had an effect on satisfaction (.49), and interaction had effect on social presence (.48). Thus, the indirect effect of interaction on satisfaction (.20) via social presence, was lower than the direct effect of interaction (.49) on satisfaction. This means that social presence has a partial mediating effect on interaction and satisfaction in video chat group, and that interaction was weakly related to satisfaction through their effect on social presence.

5. Discussion and Conclusion

This study investigated whether perceived interaction, cognitive presence, and social presence predict or influence the outcome of CSCL. A Pearson correlation analysis was conducted to examine the relationship among each variable. The results show a significant positive relationship between interaction and satisfaction and between cognitive presence and satisfaction. For video chat, a strongly significant positive relationship was found between social presence and satisfaction. Thus the higher the sum of individual interactions, the higher social presence, and the higher learner's satisfaction.

The findings showed that social presence predicts the outcome of CSCL (satisfaction). Social presence predicts learner satisfaction in CSCL for students functioning in both of modes. Social presence explained approximately 23.4% of the variance in satisfaction for text chat. For video chat, social presence explained approximately 35.0 % of the variance in satisfaction. The current findings support previous findings of a high correlation between social presence and satisfaction (Cobb, 2011).

The results showed that for text chat there is a significant positive relationship between interaction and satisfaction and between cognitive presence and satisfaction. Regression analysis showed that cognitive presence and social presence were found to significantly predict satisfaction. This may be because interaction via text chat provides opportunities to receive input that learners could have made comprehensible. As Yamada et al. (2007) also suggested, text chat aids learners as they develop grammatical and lexical accuracy in a new language. Thus it is so for learners in text chat groups. Text chat without time pressure may afford more opportunities for learners to notice the linguistic forms in the input than they might have

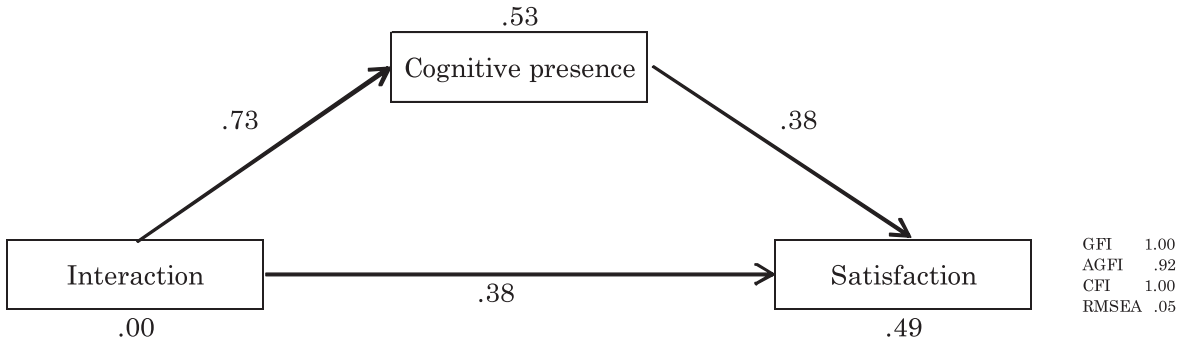

Figure 1. Results of structural equation modeling of mediating effects of social presence for text chat groups.

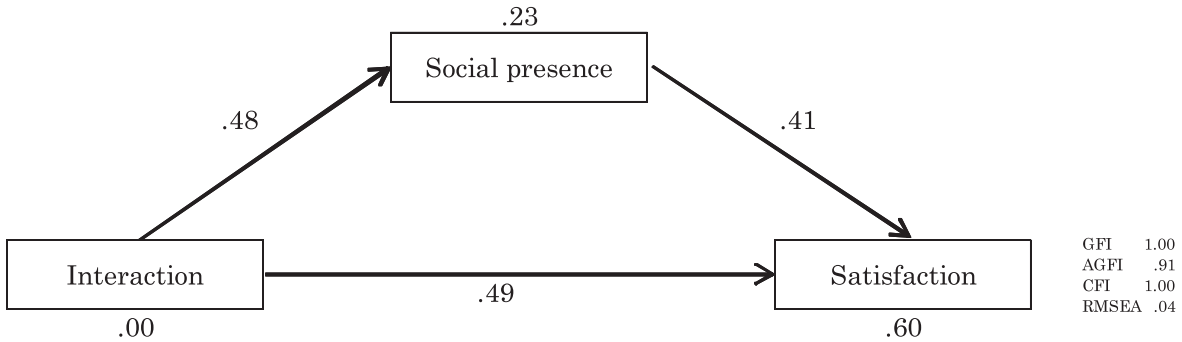

Figure 2. Results of structural equation modeling of mediating effects of social presence for video groups.

in video-chat spoken input. In addition, we found that most of the participants in text chat groups used special characters called emoticons, such as smiling, which made it easier for learners to communicate emotions (Gunawardena & Zittle, 1997). Emoticons impact social presence by compensating for the lack of social nonverbal cues (Richardson & Swan, 2003).

On the other hand, for video chat, a strongly significant positive relationship was found between social presence and satisfaction and between interaction and satisfaction. Regression analysis showed that social presence significantly predicted satisfaction. The results also support Cobb's (2011) study that found a high correlation between social presence and satisfaction. As Gunawardena and Zittle (1997) pointed out, the positive polar ends of the social indicators were: immediate, interactive, personal, sensitive, social, and warm. Actually video chat provides participants with a sense of immediacy, compared with text chat. In addition, for video chat the participants felt more satisfied; this may be partly because video chat creates a feeling of face-to-face communication, and thus the participants could easily recognize expressions of doubt, happiness and anxiety.

From the interviews, we found that the participants in video chat groups employed verbal and non-verbal communication strategies, reporting that, "regarding the gestures of my partner, I think he is funny," and "His gestures show that he is interested in what I'm saying."

As for satisfaction, the higher score for video chat than text chat was illustrated by the comment, "I made acquaintances in other parts of the country." From the interviews, regarding facial impressions, the Philippine learners reported that his/her partner was having fun, and very courteous but shy or embarrassed over delays.

From the path presence diagram and hypothesis testing, we drew the following conclusions. For text chat, cognitive has a mediating effect on interaction and satisfaction. Thus, we can say that learners using text chat developed ways to move themselves and their partners toward higher levels of cognitive processing. Thus, cognitive presence helped achieve successful learning and supported effective learning for learners in CSCL.

On the other hand, for video chat, social presence had a mediating effect on interaction and satisfaction; however, social presence has a partial mediating effect on interaction and satisfaction, but interaction was directly related to satisfaction. For video chat, we can say interaction is a more essential variable in satisfaction. However, the degree of social presence may be mitigated for video chat, partly because Japanese participants did not use non-verbal cues effectively. As for gestures, most of the Philippine

learners reported that Japanese learners used a minimal number of words to convey the meaning, and that they did not use their hands as much for non-verbal communication.

Another finding of this study is that the overall mean of Philippine learners was higher than that of Japanese learners. It is thus reasonable to infer that Philippine learners with higher English proficiency may facilitate peer interaction. It is also reasonable to infer that Philippine English learners promoted communication between themselves and Japanese English learners, and thus mutual understanding between them deepened. This inference is supported by the facts that perceived interaction of Philippine learners was higher and that video chat groups scored higher than text chat groups.

To sum up, this study has found that in CSCL, text chat is based on the constructivism, and cognitive presence closely related to learning, where learners constructed knowledge; whereas for video chat, social presence has a partial mediating effect on learning. Video chat is based more on behaviorism under time pressure, where peer interaction is a more influential predictor of student satisfaction and their learning.

6. Limitations

The major limitations of this study are the time difference between Japan and the Philippines and PC operation. At times these issues made online communication imperfect. Also, it is necessary to continue to study these issues in light of continuing technological improvements to the environment and the tools of the network.

Regarding the effectiveness of synchronized CSCL, we should consider the environment in which computers are used, English proficiency of learners, the Internet environment, and the difference of satisfaction across cultures. The results of this study were not conclusive. We need to choose the communication medium carefully, in view of the curriculum, network environment, language proficiency of the learner, and learners' characteristics. More specifically, the effects of cognitive and social presence on the relationship between either interaction, learning outcome, or satisfaction need to be explored in cross-cultural studies, and with different tasks in future studies.

Acknowledgements

This study was supported by Grants-in-Aid for Scientific Research (C) from the Ministry of Education. The authors would like to thank the students and their teachers in University of the Philippines.

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