

## The Impacts of Text-based CMC on Online Social Presence

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### Abstract

*Social presence is a critical influence on learners' online social interaction in an online learning environment via computer-mediated communication (CMC) systems. This study examines how three CMC systems, e-mail, bulletin board, and real-time discussion, influence the level of online social presence and privacy. Mixed methods were applied to examine the relationships of three CMC systems with social presence and privacy. The results indicate (a) E-mail is perceived to possess the highest level of social presence, followed by the real-time discussion and bulletin board; (b) one-to-one e-mail was perceived to have a higher level of privacy while one-to-many was perceived less privacy; and (c) in addition to the attributes of CMC systems, learners' perceptions of CMC systems impacted level of privacy as well. This study suggested that the format of CMC systems, e-mail and real-time discussion should be examined in two different formats: one-to-one e-mail, one-to-many e-mail, one-to-one real-time discussion, and many-to-many real-time discussion.*

Social presence is a vital element in influencing online interaction (Fabro & Garrison, 1998; McIsaac & Gunawardena, 1996; Rourke, Anderson, Garrison, & Archer, 1999). Social presence impacts online interaction (Tu & McIsaac, 2002), user satisfaction (Gunawardena & Zittle, 1997), depth of online discussions (Polhemus, Shih, & Swan, 2001), online language learning (Leh, 2001), critical thinking (Tu & Corry, 2002), and Chinese students' online learning interaction (Tu, 2001).

Gunawardena (1995) argues that social presence is necessary to improve effective instruction in traditional and technology-based classrooms. When the level of social presence is low, interaction is also low (Garramone, Harris, & Anderson, 1986). A lack of social presence may lead to a high level of frustration, a critical attitude toward the instructor's effectiveness, and a lower level of affective learning (Hample & Dallinger, 1995).

Social relationship, task types, confidence, choice, and involvement (Blocher, 1997; Tu, 2002a; Tu, in press) have been reported to impact social presence. Different computer-mediated communication (CMC) systems, e-mail, bulletin board (Bboard), and real-time discussion (RTD), were not clearly addressed in these studies. The purpose of this study was to examine if a relationship between these three CMC systems (e-mail, BBboard, and RTD) and social presence existed; and, if a relationship exists, how they influence social presence. A list of terms used in this study is provided to address each concept (see Table 1).

Table 1

***List of Terms and Definitions***

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Terms	Definitions
Social Presence	The degree of feeling, perception and reaction of being connected on CMC to another intellectual entity.
Social Context Dim.	CMC users' characteristics and their perceptions of the CMC environment.
Online Communication Dim.	The language used online and the applications of online language, attributes of CMC, computer literacy skills, online immediacy, and online language skills.
Interactivity Dim.	The active communication and learning activities in which CMC users engage and the communication styles they use, such as response time, task types, topics, and size of groups.
System Privacy Dim.	The actual security of CMC technologies and the considered likelihood that someone may read, or resend a message to or from you.
Feeling of Privacy Dim.	The perception of privacy psychologically, mentally, culturally, or conditionally rather than actual security.
Online Paralanguage	The use of manner of speaking to communicate particular meanings, such as capitalization, acronym, quotation, coloration, font, font size, "I agree," abbreviation, exclamation, slang, and colloquialism, etc.
Emoticons	A typewritten picture of a facial expression, such as ☺ as smiley face, etc.

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The following questions were asked to examine the learner's perception of social presence on three CMC systems:

1. Are there relationships between social presence and e-mail, bulletin board, and real-time discussion?
2. If yes, what are the relationships?
3. How do e-mail, bulletin board, and real-time discussion impact social presence?

**Literature Review**

***Social Presence***

Social presence is defined as the degree of awareness of another person in an interaction and the consequent appreciation of an interpersonal relationship (Walther, 1992). Social presence is the degree of feeling, perception and reaction of being

connected to another intellectual entity on CMC (Tu & McIsaac, 2002). Factors that contribute to social presence are social context, online communication, and interactivity.

Intimacy (Argyle & Dean, 1965) and immediacy (Wiener & Mehrabian, 1968) are social psychology concepts grounded in face-to-face settings related to social presence. These two concepts are difficult to convey in an online learning environment.

Intimacy is a function of eye contact, physical proximity, topic of conversation, etc. Changes in one will produce compensatory changes in the others (Short, Williams, & Christie, 1976). A communication with maintained eye contact, close proximity, body leaning forward, and smiling conveys greater intimacy (Burgoon, Buller, Hale, & deTurck, 1984). The interaction is unpleasant if behavior cannot be altered to allow an optimal degree of intimacy.

Immediacy is the psychological distance communicators place between themselves and their recipients (Short et al., 1976). It includes eye contact, smiling, vocal expressiveness, physical proximity, appropriate touching, leaning toward a person, gesturing, using overall body movements, being relaxed, and spending time.

Online immediacy becomes difficult to deliver because CMC lacks social nonverbal cues; however, this does not negate online immediacy or its importance. Immediacy is necessary for social contact among online learners and is even more critical than in face-to-face learning environments.

Social presence is a dynamic variable based upon the user's perception (Heeter, 1995; Lombard & Ditton, 1997) and the characteristics of the medium. People discern different amounts of social presence in various types of media. Users assess the degree of social presence; therefore, it is the internal image the perceiver evokes of a moving, expressive body. Short et al. (1976) measured social presence with a series of bipolar scales, sociable-unsociable, personal-impersonal, sensitive-insensitive, and warm-cold. A higher level of presence in a medium confers the attributes of being more sociable, more personal, more sensitive, and warmer.

Online leaders can facilitate social presence by introducing CMC communicators in the initial learning sessions (Johansen, Vallee, & Spangler, 1988). This permits the opportunity to become acquainted, encourages trust relationships early in the course; and allows the leader to encourage participation by everyone. Student's perception of social presence is impacted by the instructor's skilled use of interaction techniques in initiating online conversations with introductions and salutations (Gunawardena, 1995). Consequently, instructors or moderators should develop interaction skills that create a sense of social presence.

### *Dimensions of Social Presence*

Three dimensions of social presence have been defined: social context, online communication, and interactivity (Tu & McIsaac, 2002).

"Social context" is constructed from the CMC users' characteristics and their perceptions of the CMC environment. Social contexts, such as task orientation, users' characteristics and perception of online environments (Steinfeld, 1986), recipients' social relationships (Williams & Rice, 1983), trust (Cutler, 1995), availability of CMC, CMC access locations, social process (Walther, 1992), etc., contribute to the degree of social presence. Social presence will erode if the participants are strangers and the

conversation is task oriented and more public. Walther (1992) proposed that different social processes, settings, and purposes are components of social context and affect social presence.

“Online communication” is the language used online and the applications of online language, attributes of CMC, computer literacy skills, online immediacy, and online language skills. The text-based format of CMC requires that users possess some level of computer literacy such as typing, reading and writing; otherwise they may experience communication anxiety (Gunawardena, 1991). Training students to use the medium and making them comfortable using it is crucial to the success of collaborative learning. The degree of social presence on computer BBoards was perceived as higher for users who were more interactive (Garramone et al., 1986; Perse, Burton, Kovner, Lears, & Sen, 1992). A positive relationship exists between social presence and students’ perception of their computer expertise (Perse et al., 1992). Paralanguage and emoticons impact social presence by compensating for the lack of social nonverbal cues.

“Interactivity” includes the active communication and learning activities in which CMC users engage and the communication styles they use, such as response time, communication styles (Norton, 1986), task types, topics (Argyle & Dean, 1965; Walther, 1992), and size of groups. The potential for feedback from another contributes to the degree of salience of another person in the interaction. Immediate response is another component of interactivity. Asynchronous CMC response occurs at a different time and it takes longer to obtain a response from the other party. When an expected immediate response is not received a feeling of low interactivity is created, thus diminishing the level of social presence. However, Garramone et al. (1986) found that interactivity, allowing for feedback, contributes to the social presence of an electronic BBoard. Gunawardena (1995) differentiates interactivity and social presence, arguing that social presence requires users to add one more step to awareness of interactivity; in short, when users notice and appreciate it, there is social presence. In other words, interactivity is the “designs” and strategies to stimulate social presence. When learners appreciate it, ideal social presence is perceived and can potentially generate interactive learning.

### *Privacy*

Privacy may affect the degree of social presence. Privacy has a potential impact on human interaction in media-based communications (Weisband & Reinig, 1995), but the relationship between social presence and privacy are unstable. Tu (in press) suggested that further studies are necessary on relationships between social presence and privacy.

If a medium is perceived as more public, a sense of less privacy will be generated and vice versa. Therefore, the level of privacy is determined by the users’ perceptions in addition to the actual quality of security. Witmer (1997) identified two factors that affect level of privacy: feeling of privacy and system privacy.

Feeling of privacy refers to the perception of privacy psychologically, mentally, culturally, or conditionally rather than actual security. A less private setting results in a decreased perception of social presence. Steinfield (1986) reported that users were reluctant to employ e-mail for confidential matters in organizational settings.

System privacy refers to the actual security of CMC technologies and considers the likelihood that someone may read, or resend a message to or from you. Kerr and Hiltz

(1982) found that more than a third of the online users agreed with the statements that “information can come into the wrong hands” and “outsiders can see private messages.” Individuals with a better knowledge of computer systems will perceive low privacy because the systems are not secure.

### **CMC in the Online Classroom**

The construction of an online classroom requires “using computer-mediated communication as a tool for instructional support. That support can range from simply providing students with electronic mail in an otherwise traditional class, to actually delivering instruction and supporting student-to-student and student-to-teacher interactions at a distance” (Santoro, 1995, p. 12). CMC is comprised of three components: computer-based instruction, information, and human-to-human communication in the form of e-mail and computer conferences. The computer conferencing system is utilized to promote person-to-person communication emphasizing the achievement of interpersonal communication. CMC in an online classroom can be classified as asynchronous (time-delayed communication) or synchronous (real-time communication) systems. Participants in an asynchronous communication may communicate at any time wherever computer access is available, e.g., e-mail, BBoard, and listserv. Synchronous communication requires participants to communicate at the same time, i.e., real-time computer conferencing. Audio and video components are not usually available in CMC.

### ***CMC and Nonverbal Cues***

Nonverbal cues are defined as communicative messages that are nonlinguistic, analogic, and processed primarily by the dominant cerebral hemisphere (Andersen, Garrison, & Andersen, 1979). CMC is unable to deliver nonverbal cues because it is a text-based communication form (Connolly, Jessup, & Valacich, 1990). Hiltz, Johnson, and Turoff (1986) found difficulty for groups in reaching an agreement where more than simple facts were involved without nonverbal cues to deliver feelings and values in a text-based CMC. Utilizing positive nonverbal behaviors can greatly enhance the image of the teacher and the affective learning of students (Andersen, 1986). Online communicators may be unable to promote a positive image of CMC and, therefore, may exert a negative impact on affective learning. Emoticons and paralanguage are proposed to compensate for the lack of nonverbal cues.

### ***Research on Impacts of Social Presence***

Social relationships (Tu, 2002a), task types (Tu, 2002a), attributes of CMC, confidence, choice, and involvement (Blocher, 1997) impact the degree of social presence.

Different social relationships and task types demonstrated both positive and negative impacts on the levels of social presence. Love, information, familiarity, and social relationships of trust exert a positive impact on social presence while service, status, assertiveness/acquiescence, and conflict relationships exert a negative impact (Tu,

2002a). Task types, such as generating and choosing ideas, and social tasks appear to exert a positive impact on social presence while negotiating tasks and conflict tasks exert a negative impact (Tu, 2002a).

Blocher (1997) concluded that confidence, choice, and involvement had impacts on the levels of social presence on learners. When learners feel more confident, are able to make learning choices, and are actively engaged in learning activities, a higher level of social presence is demonstrated.

## **Method**

Both quantitative and qualitative methods were used to acquire a better understanding of the relationship between social presence, privacy, and CMC (e-mail, BBoards, and RTD). Fifty-one students enrolled in a graduate level course at a four-year university in the southwestern U.S. were the subjects. The course was offered in two formats: one televised and the other face-to-face. The same instructor taught both classes using exactly the same course content, lectures, assignments, and class requirements.

### ***Qualitative Method***

Participant observation was used to capture student perceptions of social presence and privacy via three CMC systems. FirstClass, a computer conferencing system providing e-mail, BBoard, and real-time discussion functions, was used for class communications.

Data were collected through casual conversation, in-depth interview, direct observation, and document analysis. The casual conversation was conducted between the researcher and the subjects in the researcher's office, the classroom, or any convenient location. Observations were conducted in the classroom, the computer laboratory, and through online asynchronous and synchronous class discussions.

Eight semi-structured in-depth interviews were conducted with participants during the 12th week to explore particular concepts in social presence, privacy, and three types of CMC. Document analysis included all messages delivered on FirstClass and outside e-mail received by the instructor and the teaching assistant.

### ***Quantitative Method***

Fifty-one participants were asked to answer the CMC Questionnaire (Tu, 2002b) in Week 12 of the semester. This questionnaire, evaluating e-mail, BBoard, and RTD, contains 17 social presence items and 13 privacy items each with a 5-point Likert scale. Participation in this survey was voluntary. Forty-three responses (84.31%) were returned.

Bartlett's test of sphericity (Bartlett, 1950) was applied to increase the validity because of the small number of participants. This tested whether the correlation was statistically different from zero by comparing the correlation matrix (R) and identity matrix (I). If  $R \neq I$  the correlation was significant then factor analysis could follow (Pedhazur & Schmelkin, 1991). The power of the Bartlett's test of sphericity is that it is sensitive to the sample size (Knapp & Swoyer, 1967). Therefore, if the zero correlation is rejected by a small sample, there is greater validity.

Exploratory factor analysis was utilized to examine the dimensions of social presence and privacy. Items producing Eigenvalues greater than 1.00 were considered to be significant factors. Scree testing with visual inspections was used to determine the number of factors/clusters to be extracted. Exploratory factor analysis was utilized. Humphrey-Ilggen Parallel Analysis was applied, two data matrices were analyzed simultaneously, and their Eigenvalues were plotted. Additionally, Cattell's Scree test and Kaiser's Criterion were used to determine the number of factors to extract. Pearson correlation was computed to explain the relationship of privacy and social presence.

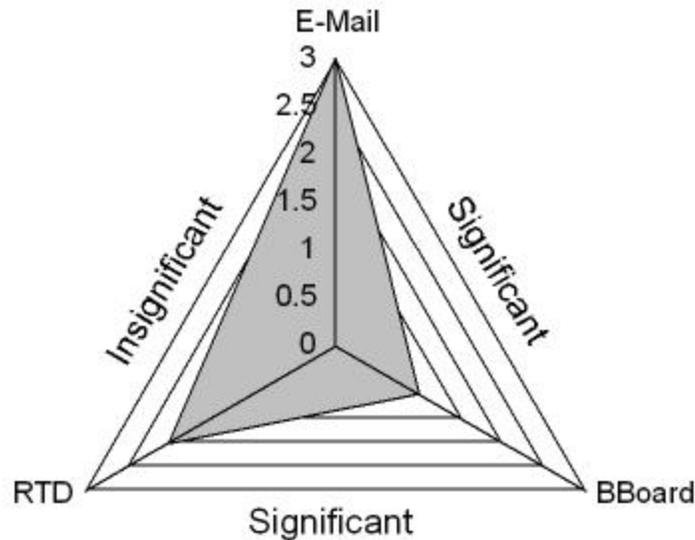
## **Results**

Forty-three of 51 subjects responded to the online questionnaire. More than half of the subjects 28 (65.12%) were female with 15 (34.88%) males. The ethnic mix was composed of 31 Caucasian (72.09%), 4 Latino (9.30%), 4 African American (9.30%), and 4 Asian and Pacific Islander (9.30%). Subjects estimated their computer expertise as novice (9, 20.93%), intermediate (29, 67.44%), and expert (5, 11.63%); more than half felt that their computer expertise was intermediate or higher. Most accessed computers at home (40, 93.02%), at computer laboratories (30, 69.77%), in classrooms (19, 44.19%), in offices (18, 41.86%), and at libraries or media centers (14, 32.56%).

Subjects had been using e-mail longer than BBoard and RTD. Slightly less than 75% of the students had been using e-mail from 1–6 years; while more than a half of them had less than 1 year experience in BBoard and RTDs, their experience on BBoard and RTD was equivalent.

### ***Quantitative Results***

Because of the small number of participants ( $N = 43$ ) it was necessary to conduct Bartlett's Test of Sphericity to examine the validity of the results,  $\chi^2 = 774.90$  with  $df = 44$ . The hypothesis that the correlation matrix was an identity matrix was rejected at the .01 of  $\alpha$  level. The correlation matrix produced a significant chi-square by this test; therefore, factor analysis proceeded. A summary illustration of the quantitative results is presented in Figure 1.



**Figure 1. The levels and relationships of social presence and privacy between/among three CMC systems.**

An exploratory factor analysis was performed on 30 questionnaire items concerning social presence (social context, online communication, interactivity) and computer privacy (system privacy and perception of privacy). These five factors accounted for 76.74% of the variance. The five factors were extracted using varimax rotation. With a cutoff of .45, three items were removed from the loading, item numbers 15, 17, and 29, respectively. These five factors were social context, online communication, interactivity, system privacy, and feeling of privacy. Cronbach's coefficient alpha for these five factors was .82, .88, .73, .76, and .71, respectively. All items loaded on five factors (see Table 2) except for three items that did not load on any of the factors (smaller than .45). They were "user relationship," "being unfamiliar with persons," and "being unfamiliar with topics."

### ***Differences Among Three Systems***

One-way repeated-measures, ANOVA, were computed for three CMC systems on the level of social presence and privacy. This examined the difference of social presence for each system but did not indicate the exact differences of the systems. The result indicated a significant difference in the level of social presence and privacy among these three CMC systems; Wilks'  $\Lambda = 0.41$ ,  $F(2, 41) = 29.65$ ,  $p < .05$  for social presence and Wilks'  $\Lambda = 0.67$ ,  $F(2, 41) = 10.32$ ,  $p < .05$  for privacy. e-mail received the highest rate on the level of social presence ( $M = 3.44$ ,  $SD = .40$ ), followed by the RTD ( $M = 3.40$ ,  $SD = .38$ ) and BBoard ( $M = 3.11$ ,  $SD = .39$ ), while e-mail received the highest rate on the level of privacy ( $M = 3.15$ ,  $SD = .58$ ), followed by the RTD ( $M = 3.13$ ,  $SD = .49$ ) and BBoard ( $M = 2.97$ ,  $SD = .48$ ).

Table 2

***Five Factor Loadings***

Social Context	Online Communication	Interactivity	System Privacy	Feeling of Privacy
Social form	Conveys feeling & emotion	Pleasant	System operator & someone may repost messages sent to or from you	Feeling of confidentiality
Informal & casual way to communicate	Stimulating	Immediate	Someone may accidentally send & receive messages to & from individuals other than the intended recipients	Feeling of privacy
Sensitive means	Expressive	Responsive	Technically reliable	Perception of privacy
Comfort with familiar persons	Meaningful		Possibility of embarrassment	Importance of privacy
	Easily understood	Comfortable with familiar topics	Identity concerns	Level of security/secret
				Risk of sharing personal topics

Because the ANOVA overall test yielded a significant result, three pairwise comparisons among three CMC systems for social presence and privacy were conducted to assess which means differed from each other (see Tables 3 & 4). For both social presence and privacy, two of the three pairwise comparisons were significant, controlling for familywise error rate across the three tests at the .05 level, using the Holm's sequential Bonferroni procedure to minimize the chances of making a Type I error. The Bonferroni approach is where the number of tests computed is divided by .05. A test would not be significant unless its *p*-value is less than the corrected significance level. E-mail/BBoard and BBoard-RTD were significant for both social presence and privacy.

Table 3

***Paired Samples Test for Three CMC Systems for Social Presence***

	Paired Differences					<i>t</i>	<i>df</i>	Sig.
	<i>M</i>	<i>SD</i>	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
E-mail-Board	-.32	.29	.04	-.41	-.23	-7.21	42	.00*
E-mail-RTD	-.03	.29	.04	-.12	.05	-.77	42	.44
Board-RTD	-.29	.30	.05	-.38	-.20	-6.35	42	.00*

\**p* < .05, two-tailed.

Table 4

***Paired Samples Test among Three CMC Systems for Privacy Factor***

	Paired Differences					<i>t</i>	<i>df</i>	Sig.
	<i>M</i>	<i>SD</i>	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
E-mail-Board	.17	.37	.06	.06	.29	3.01	42	.00*
E-mail-RTD	.01	.46	.07	-.13	.16	.212	42	.83
Board-RTD	-.16	.28	.04	-.24	-.07	-3.61	42	.00*

\**p* < .05, two-tailed.***Differences Among Five Factors and Three CMC Systems***

Because the ANOVA overall test yielded significant results, three pairwise comparisons among three CMC systems were conducted to assess which means differed from each other for five factors (see Table 5). Four of 15 pair comparisons were not significant. All three pairs appear significantly different on the Feeling of Privacy factor.

Table 5

***Pairwise Comparisons of Social Presence and Five Factors***

	E-mail-BBoard	E-mail-RTD	BBoard-RTD
Social Presence	.00*	.44	.00*
Social Context	.00*	.38	.00*
Online Communication	.00*	.00*	.80
Interactivity	.00*	.53	.00*
System Privacy	.80	.02*	.01*
Feeling of Privacy	.00*	.02*	.01*

\* $p < .05$ .***Differences of Privacy in CMC Systems***

Because the ANOVA overall test yielded a significant result, three pairwise comparisons among three CMC systems for system privacy and feeling of privacy were conducted. One-way repeated-measures, ANOVA, were computed for three CMC systems on the level of system privacy and feeling of privacy. The results indicated a significant difference in the level of system privacy among these three CMC systems, Wilks'  $\Lambda = 0.82$ ,  $F(2, 41) = 4.44$ ,  $p < .05$ ; and Wilks'  $\Lambda = 0.48$ ,  $F(2, 41) = 22.09$ ,  $p < .05$  for Feeling of Privacy. RTD was perceived with more system privacy while e-mail was perceived with the least system privacy. E-mail was perceived as a medium with a greater feeling of privacy while BBoard was perceived with the least feeling of privacy (see Table 6).

Table 6

***Means and Standard Deviation for Three Systems for System Privacy***

	<i>M</i>	<i>SD</i>	<i>N</i>
System Privacy			
E-mail	3.13	.70	43
BBoard	3.14	.67	43
RTD	3.30	.66	43
Feeling of Privacy			
E-mail	3.06	.68	43
BBoard	2.23	.59	43
RTD	2.46	.58	43

Because the ANOVA overall test for both system privacy and feeling of privacy yielded significant results, three pairwise comparisons among three CMC systems were conducted to assess which means differed from each other (see Table 7). Two of the three pairwise comparisons for system privacy and all three pairs for feeling of privacy were significant controlling for familywise error rate across the three tests at the .05 level.

Table 7

***Paired Samples Test among Three CMC Systems for System Privacy & Feeling of Privacy***

	<i>M</i>	<i>SD</i>	Paired Differences			<i>t</i>	<i>df</i>	Sig.
			Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
<b>System Privacy</b>								
E-mail-Board	.01	.34	.05	-.11	.10	-.17	42	.87
E-mail-RTD	-.17	.45	.07	-.31	-.03	-.24	42	.02*
Board-RTD	-.16	.36	.05	-.27	-.05	-2.95	42	.01*
<b>Feeling of Privacy</b>								
E-mail-Board	.82	.80	.12	.58	1.07	6.73	42	.00*
E-mail-RTD	.60	.69	.10	.38	.81	5.68	42	.00*
Board-RTD	-.23	.42	.06	-.36	-.10	-3.56	42	.00*

\**p* < .05, two-tailed.

***Qualitative Results***

Qualitative data analysis began with three dimensions (social context, online communication, and interactivity) and privacy factor as derived from the literature and the quantitative results. The three basic dimensions and the privacy factors remained unchanged. However, the qualitative data analysis indicated that there were different variables that contribute to social presence and also addressed the phenomenon found in quantitative data. A summary of qualitative results is presented in Table 8.

Table 8

**Summary of Qualitative Results**

	E-Mail		BBoard	RTD	
	One-One	One-Many	One-Many	One-One	Many-Many
Social Presence					
Social Context Dimension					
Overshadow Effects					
Assertive					X
Authority Presence		X	X		X
Access/Locations		X	X		X
	X			X	
Online Communication Dimension					
Keyboarding Skills					
Immediacy				X	X
Characteristic of RTD	X	X	X	X	X
Amount of messages				X	X
Message Styles	X	X	X	X	X
	X	X	X	X	X
Interactivity Dimension					
Response Time					
Length of Messages	X	X	X		
Size of Discussion Group	X	X	X	X	X
		X	X		X
Privacy					

**Social Context**

Social context is constructed from the users' characteristics and their perception of the CMC environment. The important issues identified were overshadow effects, assertiveness, authority presence, access, and location.

**Overshadow Effects.** Overshadow effects—being familiar with recipients—impacted social presence in RTD. When several RTD participants were familiar with each other they tended to “overshadow” the other participants and generate negative feelings.

**Assertiveness.** The students who participated more (assertive) and those who participated less (acquiescent) impacted other students' online participations. Students who participated more in a RTD were generally more social, talked more, typed faster, or made more contributions of greater content than others.

Students felt uncomfortable, unequal, and pressured while talking to more assertive people. When students were behind in the discussion they felt “bad” and “nervous” because they claimed they were unable to maintain the discussion speed. The fast typists felt the same way. The most negative feeling generated was “resentment.”

**Authority Presence.** More formal conversations were found when students communicated with the instructors in RTD. Students responded that when they communicated with the instructors or when the instructors were presented in a RTD, they would adhere to the discussion topics, make the points clearer, be polite, not tell jokes, and not show their personality, even when the instructors just observed. During interviews, students claimed that it was to protect their grade and the tradition of the teacher-to-student relationship.

**Access and Locations.** Access and locations of the computers appeared to be a critical element in this study. Multiple pressures were applied to those students who were required to access the computer in a public facility: waiting in line, the lack of privacy, and fear of losing the computer workstation if they left for the restroom, among others. Those students were stressed because they had to wait in line to get to the computer. This situation was particularly anxiety ridden if a RTD was scheduled at a certain time and the student was unable to gain access to a computer.

### ***Online Communication***

Online communication is defined as the language used online, attributes of CMC, and users' perceptions of CMC. This dimension includes computer keyboarding skills, immediacy, multiple topics, amount of messages, and message style.

**Computer Keyboarding Skills.** Actual computer keyboarding skills and perception of their skills are critical in CMC. One is considered as online "handicapped" without keyboarding skills, particularly in RTD because simple interaction with others is prevented.

The users' perceptions of their own keyboarding skills also influenced the level of interaction. Many students believed that they could not type, but observations of the students revealed that the majority possessed average skills and just a few students were below average.

Keyboarding skills were less critical in asynchronous communication because of the time delay. Therefore, they felt more comfortable. One Asian student commented, "I used the spell check and the grammar check with e-mail and bulletin board." Although it seemed to be a tedious process to communicate online, students felt more comfortable and perhaps produced thoughtfully composed communication of better quality.

Spell check for e-mail and BBoard is a useful tool when correcting typos, but there is no time to use it in a RTD. E-mail was perceived as casual written communication and students did not use spell check to correct their typos, even though they thought they should. Keyboarding speed and accuracy of typing were elements that influenced interactive communication. Typographical errors can be found in most online communication messages, particularly during RTDs. Normally students would experience embarrassment about typos and would apologize. In fact, most of the students were not much concerned about other's typos. A Chinese female responded that it was difficult to know if the errors were typos in messages. She thought errors were words that had special meaning in the messages, causing her to spend a great deal of time trying to find the "words" in the dictionary.

**Immediacy.** Immediacy is defined as the psychological distance among users. It includes the ability to be expressive and convey feelings and emotions.

Students relied on text-based communication to express the meanings they intended to deliver, which is critical to the level of online interaction. Expressing one's meanings was particularly difficult for ESL (English as a second language) students and was compounded when discussing theoretical concepts.

Students' thinking and typing did not synchronize. Normally, thinking is faster than typing and students experienced difficulty expressing their thoughts while typing. Conversely, students perceived that text-based CMC could be very expressive and even used e-mail to display "compassion" for others.

The process of conveying feelings and emotions is very important in human communication. CMC messages are prone to be dull because it is a text-based communication and there is a constant search for "simulations" to generate and deliver their feelings and emotions. Students used emoticons and paralanguage to compensate for the lack of social context cues in the online environment. The most commonly used emoticons was ":-)" or "☺" for smiling face and "☹" for a frown. Many of the paralanguage expressions used by students in this study were identified as capitalization, acronym, quotation, coloration, font, font size, "I agree," abbreviation, exclamation, slang, and colloquialism.

Students felt that the application of emoticons and paralanguage were more vivid, warm, personal, friendly, and casual. As to the "personal touch" feeling, students felt it was more pleasant to read the messages. Students perceived RTD as more conversational in style and more casual than e-mail and BBoard communication; they used more paralanguage in RTD than in e-mail and BBoard. The use of emoticons occurred evenly across the three CMC systems.

**Multiple Topics.** RTD possesses several characteristics that have positive and negative impacts on students' online interactions, such as the multiplicity of discussion topics, the lack of visual contact, and the fast pace. In a RTD environment, students were allowed to make liberal contributions and could easily launch into a new topic. Students felt that it was difficult and confusing to follow the conversations because multiple topics were discussed simultaneously. Topic changes occurred extremely rapidly so that students frequently felt that they were on and off the conversations. The topics shifted from one to the other and then sometimes shifted back without much focus. Because of the multiple topics and the rapidity with which the topics changed in discussions that occurred in limited time periods, students opined that it was very hard to find a consensus at the end of a discussion. This produced frustration and prevented effectiveness in the discussion, particularly when there were more than three or four people in one RTD room. Students lost the thread of the discussion in RTDs and became confused. Wondering "who" is talking to "whom" about "what" made students confused and frustrated. However, this did not occur only with the slow typists; fast typists responded with similar feelings. This situation resulted in the students' being less willing to participate, and even, perhaps, their withdrawing from the discussion.

**Amount of Messages.** The number of messages posted to the three CMC services had an impact on students' social presence. They felt that there were too many BBoard messages to read. Ma, a Chinese female, described her feelings: "When I had difficulties to finish reading all of the messages, I felt so much pressure. I was exhausted and confused enough not to know how to write my response."

**Message Styles.** Generally, message styles are different for e-mail and BBoard. Being unfamiliar with the various formats may degrade social presence. Ling, a Chinese female, was not familiar with the format of BBoard discussions and replied formally to the discussion until she realized that they were supposed to be “casual,” like “oral” conversations.

### ***Interactivity***

Interactivity is defined as people being engaged together in activities. It includes issues involved in CMC response time, length of messages, and the size of discussion groups.

Response time is a critical factor in determining student interaction on CMC. Students’ responses to CMC messages varied depending upon synchronous and asynchronous modes and their customs in responding to CMC messages.

Students’ attitudes toward late responses or no responses varied individually. When a response was perceived as late, or no response was received, a negative impact on interaction was generated, particularly when a rapid reply was needed. Therefore, it is necessary to define an appropriate response time. When a reply was expected in the asynchronous setting and it was received late or not at all, problems were generated with online interaction. Negative feelings, such as “rejected,” “been ignored,” “disregarded,” “mad,” “angry,” “disappointed,” and “bad” were generated, resulting in a decreased desire to participate and consequently less interactive communication.

Students felt that RTD was the most interactive medium of the three CMC systems because it provided “instant” responses. The downside was that there was no time to reflect on the messages or prepare a response. This presented greater difficulty for ESL students and slower typists. Students also reported that the most difficult task was scheduling a time for the RTD, a particularly daunting hurdle when large numbers of participants were involved.

E-mail and BBoard communication allowed students to interact with each other at their convenience. Students responded whenever they had an opportunity and were able to control their own ideal communication format. The major disadvantage was that it was necessary for the recipient to check for messages. If the recipient did not regularly check for messages there was no presence, no conversation, and no interaction.

The length of the messages had an influence on students’ interaction as well. It was found that RTD tended to have the shortest messages, followed by e-mail, with the BBoard messages tending to be longer. Improper length of messages could cause “misunderstanding,” be “unreadable,” etc., students opined in the interviews.

The size of the discussion group had a major impact on students’ interaction, particularly in RTD. All students agreed that when there were more people in a RTD, the discussion was “chaos,” they lost the sense of “who” was talking to “whom” about “what,” and they were unable to maintain the discussion pace.

## *Privacy*

The privacy factors included system privacy and feeling of privacy. E-mail was considered to be the most private, followed by one-to-one RTD and one-to-many e-mail, then many-to-many RTD. BBoard was considered to be the least private.

***System Privacy.*** System privacy referred to the security of CMC technologies regarding the likelihood that someone may read, send, or resend a message to or from you. Some students were aware that CMC systems were not private, but they thought that they should not be concerned.

***Feeling of Privacy.*** Feeling of privacy referred to students' perception of the extent of privacy on CMC systems. When students perceived a medium to be more private they would be more open, and vice versa. Messages on the BBoard were more task-oriented and less personal information was exchanged because of its more public and permanent nature: anyone anytime may obtain access to these messages. Students responded that when more than two people are involved in the RTDs they were also more public. Some students were aware that RTD messages could be permanent and less private and some thought that messages were deleted after the conversation unless they were saved.

When students developed the sense that the medium was more public, the message was less personal. A personal message that appeared in a more public arena could be embarrassing and create discomfort for either the sender or the recipient. There was an embarrassing situation that occurred in one team between two members. Ling, another team member, described her feelings about the message:

She (teammate) said she has difficulties to get in touch with us. She was not very happy. She complained that the subject was not familiar with her. So she just does it perfunctory...I feel very strange!! She posted this message on the bulletin board.

Students were concerned that the messages they posted might appear in public despite being posted in a more private format, such as e-mail or RTD. They felt that the recipients could very easily print the messages, pass them around, or repost them to more public areas. Judy, a class member, expressed her concerns: "You should never say anything that could be, you know, printed out by someone and then misinterpret it, pass around..."

Students felt that a message was more private when it was posted in a one-to-one format, i.e., one-to-one e-mail or one-to-one RTD. It was more comfortable for students to share personal information in a one-to-one communication because they believed that no one would read their messages, or that no one would be interested in their personal conversation. It can be embarrassing if a personal message appears more publicly.

Students reported that online privacy was important to them, but were unconcerned about this issue because they felt that no one would be interested in their class CMC messages. Risk-taking clearly emerged in the online environment.

## **Discussion**

This study reveals that there is relationship between social presence and three CMC systems, e-mail, BBoard, and RTD as well as privacy. E-mail was felt to possess the highest level of social presence, followed by the RTD and BBoard. The level of social presence and privacy on BBoard is significantly different from e-mail and RTD because it is considered to be more public and represents a permanent record. The mixed-method analysis reveal that simple examination of the three CMC systems is unable to separate CMC modes (one-to-one, one-to-many, and many-to-many modes) and attributes (asynchronous and synchronous) because the style of the discussions imposed a very different level of privacy and personal feeling. A comprehensive understanding of impacts on social presence cannot be derived from a simple examination of general categories of communication (e-mail, BBoard, and RTD). Specific categories must be examined, such as one-to-one e-mail, one-to-many e-mail, BBoard, one-to-one RTD, and many-to-many RTD, when evaluating the effects of CMC in the online learning environment.

The discussions below provide more details and suggestions on improving social presence in terms of three CMC systems.

### ***Keyboarding Skills***

Keyboarding skill critically impacts the students' perception of social presence in all three CMC systems. The important issues are students' actual skills, perceptions of their skills, use of spell checks, speed, accuracy, etc. Improving students' keyboarding skills, encouraging a positive attitude toward their skills, applying appropriate uses of spell check, and improving accuracy are important strategies to be included in online instruction to enhance active learning. Instructors should provide special attention to students who lack these skills and over time their skills will improve. Spell check may not be appropriate for RTD because it requires an instant response while it is more appropriate for e-mail and BBoard, particularly BBoard, because it is public and permanent. Instructors should make online students aware of the appropriate uses of these aids.

### ***Immediacy***

Using three CMC systems to deliver immediacy is challenging. Students need to learn how to deliver necessary immediacy to increase interaction. Text-based communication lacks social cues, so students must apply alternatives to express meaningful language and emotions, such as paralanguage and emoticons, particularly useful for RTD. With both alternatives, the conversations are more meaningful, and more personal. Not everyone is accustomed to using paralanguage and emoticons; therefore, it is necessary for instructors to "model" appropriate use of both alternatives in regular communications. However, overuse may result in confusion, insincerity, impoliteness, etc.

Synchronizing thinking and typing is a challenging issue since humans can think faster than they can type. To accommodate this difficulty, instructors should advise

students to be understanding and always take time to clarify their messages. Taking for granted that a statement is clear may cause unnecessary misunderstanding.

### ***Length of message***

Length of messages varies from system to system. Messages in RTD are generally shorter than e-mail and BBoard. A message that is either too long or too abbreviated may cause communication difficulties, unreadable content, misunderstandings, withdrawing from conversation, etc. Online users should keep RTD messages short. Complete sentences may not be necessary. For e-mail, if there are large texts to be delivered it should be attached to eliminate any difficulty in reading. BBoard tends to allow longer texts, but voluminous messages should be separated into separate messages to reduce potential negative feelings.

### ***Asynchrony***

Asynchronous CMC systems include e-mail and BBoard. Due to the time delay both systems provide students with opportunities to communicate at their convenience, allowing time to reflect upon their communications. It requires that students check their messages. Communication will not occur if students do not take the time to access and respond to messages. Instructors should clarify how frequently students should check their e-mail messages and BBoard messages. Message styles for e-mail and BBoard are not necessarily the same. BBoard messages tend to be more formal than e-mail messages. However, term paper style may not be appropriate for BBoard. E-mail is more casual and informal, unless it is an initial contact to an unfamiliar person. Online users should evaluate the situation to determine which CMC system should be used and apply the appropriate message style.

### ***E-Mail***

Personal sense and responsiveness are critical to applications of e-mail. When one uses e-mail to communicate with others, a response is expected. Negative feelings and perceptions are generated if the recipient's response is not timely. Most online users have not developed the habit of checking e-mail messages regularly. A 1- to 2-day response time is appropriate. During weekends or holidays, a longer response time is acceptable.

Inappropriate use of e-mail, which is considered a personal communication, may cause negative communication and degrade social presence. Forwarding e-mail and one-to-many e-mail messages are common communications. The forwarding of personal messages to multiple recipients may prove embarrassing or demeaning to the original communicators. E-mailers should not write any message that they would not say in a face-to-face situation. It is advised to request permission if one intends to forward a personal e-mail message to multiple recipients.

## ***Bulletin Board***

The amount of messages and privacy issues are important in BBoard. A large amount of messages is generated for reading and response if the group or class is large. Large volumes of messages may cause students to experience negative feelings and a sense of being overwhelmed, to skip messages, or to withdraw from the discussion. Large groups or classes should be divided into smaller groups or teams.

BBoard messages are permanent and cannot be erased; therefore, they are less private. It is suggested that the message should be reviewed before it is posted. Instructors should explain suitable etiquette for BBoard posting and monitor posting closely. Improper postings must be removed and the authors of the posting must be counseled.

## ***Synchronicity***

RTD is a unique way to communicate in an online environment. It generates different positive and negative impacts on social presence. RTD is synchronous and able to provide “instant” and “active” communication; however, it allows less time to respond to and reflect on messages. It can be applied to two different modes, one-to-one and many-to-many; therefore, it generates more complicated applications.

Due to the real-time requirement, all participants must be present at the same time. This creates several difficulties for users, such as different time zones and inability to access computers at the specific time. Therefore one should consider the students’ situation in accessing a computer and provide suitable activities to engage students in RTD.

Organization and facilitation are vital to RTDs. Several situations identified in this study may degrade social presence and inhibit online interaction. People who know each other may overshadow those they do not know during RTD. Additionally, assertive students and the presence of the instructor may inhibit the participation of some students. It is challenging to moderate and foster democratic participation in interactive RTDs. Generally, passing authority to students and empowering them are effective strategies to eliminate negative impacts, but the instructor’s facilitation is dynamic and crucial.

RTDs result in multiple-topic discussions, which cause students to become confused, and unable to follow the discussion. They may even withdraw, which is particularly noticeable in many-to-many discussions. Students’ common feelings are that they lose the sense of “who” is talking to “whom” about “what.” Strategies recommended are to keep the number of RTD participants small, to take turns, to advise students to listen, to encourage or invite privately those who remain silent, and to monitor conversations.

Many students have ignored circulating real-time messages because students think that messages are erased after finishing RTDs. In fact, messages can be very easily saved and passed around or even posted in a public area. All CMC messages should be considered public (Witmer, 1997). One should not say something that would not be said in face-to-face communication.

### ***Privacy***

Among three CMC systems, it appeared that e-mail was ranked as the most private system, followed by one-to-one RTD, one-to-many e-mail, and many-to-many RTD; BBoard was considered to be the least private. Naturally, when more than two participants are engaged in conversation, CMC systems are considered more public because more people have access to the messages.

Most students were aware that no privacy exists in computer systems. Students believed that a system administrator or someone might break into the system and post/resend messages from/to you. But, on the other hand, the students responded that no one would be interested in their messages because it was just class work. It is necessary to advise students not to post any unethical messages. Secured systems, encrypted functions, and passwords should be provided to increase system privacy.

It is recommended that instructors should take the feeling of privacy into consideration when applying different CMC systems into their instruction. If contents are more sensitive or confidential issues and topics are discussed, highly secured and more personal CMC modes should be applied.

### **Conclusions**

Different CMC systems have different degrees of impact on social presence. The impact not only comes from the attributes of CMC systems, but also the uses and various perceptions of CMC systems. This study addresses the complications of online communication. Many online users apply face-to-face communication skills to an online environment. Unfortunately, traditional communication skills may not apply properly; therefore, assisting online students in adopting appropriate online communication skills, in utilizing different CMC systems effectively, and in encouraging a positive attitude toward CMC systems are necessary to enhance online social presence.

No one CMC system is better than the other. In fact, providing multiple CMC systems and allowing students to select based on their personal preferences, situations, conditions, and opportunities are necessary. In this environment, students are empowered to determine what, how, and where they would like to learn, and a wider range of learners can be accommodated, rather than forcing them into a one-size-fits-all mode.

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