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# Technology Type, Gender and Social Presence: An Experimental Study

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## Abstract

*Research on virtual learning groups is still in its infancy, despite the related technology's proliferation in education institutions. This paper reports on an experiment investigating the relationships among type of technology, gender, social presence, and learning outcomes. Using a 2x2 factorial design, each same-gender group collaborated on a learning task, using either videoconferencing, or synchronous-textual CMC as the means for interaction. Empirical results reveal that learning outcomes are not affected by technology type and gender. However, perceived social presence, which has significant correlations with satisfaction and perceived learning, plays a plausibly significant role in affecting satisfaction and perceived learning. The paper deliberates that cultural dimension, time and group size may have moderated the gender effects. The results are discussed with reference to previous studies, and implications and conclusions are drawn.*

**Keywords:** Social Presence, Synchronous CMC, Satisfaction, Perceived Learning, Performance

## 1. Introduction

The emergence of groupware in the 21<sup>st</sup> century has contributed to the growing number of virtual teams within and between educational institutions. Computer-mediated communication (CMC) enables synchronicity by allowing real-time interactions (Spencer & Hiltz, 2003). For instance, videoconferencing (VC) permits real-time transmission of video images and audio (Spencer & Hiltz, 2003), while chat rooms allow synchronous-textual interaction.

Previous research has suggested that the immediate response offered by such an environment may establish a sense of social presence<sup>1</sup>, reduce the transactional distance between participants, and diminish the inherent possibility for misunderstanding (Mercer & Davie, 2002; Herring, 1999; Murphy & Collins, 1997). In addition, the time lag inherent in text-based CMC enables learners to reflect on their own perspectives (Berge, 1997).

Distance learning is expanding at an accelerating rate and many educational institutions are attempting to capitalize on the distance learning programs (Jason et al. 2001). Virtual teams are typically utilized in distance learning classes, as students work in small groups to accomplish assignments (Smith, 2000). Although geographically distributed learning teams are foreseen to become commonplace in the 21<sup>st</sup> century, the conceptual understanding of these groups is still in its infancy (Smith, 2000).

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<sup>1</sup> Social presence is the degree to which a medium is perceived as conveying the presence of the communicating individuals (Short et al., 1976).

Findings of a few studies have suggested that CMC learning is not as effective as traditional learning (e.g., Bullen 1998; Fisher et al., 2000), citing the absence of face-to-face (fTf) meetings as the reason. However, there are also studies that have demonstrated CMC-supported groups to be as effective as, or more effective than traditional groups in terms of learning and quality of solution (e.g., Benbunan-Fich and Hiltz, 1999; Ocker and Yaverbaum, 1999). With these apparent inconsistencies, there is a need to identify factors that may moderate the relationship between technology and learning outcomes. Furthermore, the role of social presence requires greater exploration (Rourke et al., 2001). According to Gunawardena (1995), social presence is a vital factor in affecting instructional effectiveness in traditional and technology-based classroom. Prior research has demonstrated that immediacy, a closely related concept of social presence, is significantly related to learning outcomes among students in fTf classroom (Sanders & Wiseman, 1990; Christophel, 1990). However, more research is warranted to determine the extent to which social presence would play a similarly important function in a synchronous CMC learning context. Text-based CMC and VC are inherently different from fTf environment. Text-based CMC lacks social, contextual cues (Sproull & Keisler, 1986); videoconferencing lacks the physical togetherness (Sniezek & Crede, 2002). Consequently, past findings in a traditional learning environment may not be generalizable to geographically dispersed members working to complete assignment in a virtual learning setting. In essence, more research is in want on the effects of technology-mediated presence.

Alavi & Leidner (2001) asserted that greater depth and breadth of research in technology-mediated learning require an “explicit consideration of relationships among technology capabilities, instructional strategy, psychological processes and contextual factors in learning” (p.1). Current research has largely focused on asynchronous learning networks, while synchronous CMC has received reasonably less attention in the educational research realm. The growing use of collaborative technologies (both asynchronous and synchronous) in dispersed learning teams makes it important to understand whether learning outcomes differ significantly among various types of media.

Additionally, gender-based differences in performance and communication style in computer supported learning environments were deemed as an important element for research (Gunn & McSporrnan, 2003). Traditional fTf classroom has well-documented gender differences in participation, where male participants tend to dominate discussions (Renee, 1994; Spender, 1982). Much existing gender literature in computer conferencing environment has also addressed variations in terms of communication styles and participation rates between males and females (e.g., Blum, 1999; McLean & Morrison, D., 2000). A closely related issue pertinent to learning research has to do with the relationship between gender and learning outcomes.

The current study examines the impact of technology type on perceived social presence and learning outcomes (perceived learning, team performance and students’ satisfaction), the role of social presence in synchronous CMC (videoconferencing and real-time chat) supported teams and whether the gender factor may shape perceived social presence and learning outcomes in these environments. Specifically, three questions are addressed in this paper. First, what is the relationship between perceived social presence and learning outcomes in these synchronous CMC supported teams? Second, does technology type influence learning outcomes and social presence? Third, does gender influence learning outcomes and perceived social presence?

## **2. Theoretical background**

### ***2.1 Collaborative learning and social interaction***

Educational theories are shifting towards the collaborative constructive conceptions of learning (Anderson and Garrison, 1998), as opposed to the objectivist learning approach. Educators increasingly deem social interaction as an integral element of collaborative learning. Ocker and Yaverbaum (1999) present learning as a process of knowledge construction, mediated by social interaction and tool use (Vygotsky, 1962). As noted by Hiltz (1994), “the social process of developing shared understanding through communication is the ‘natural’ way for people to learn” (p. 22).

A study which examined synchronous collaboration groups (embedded in asynchronous online courses) concluded that the scaffolding required for knowledge building came from knowledgeable peers, besides facilitators and teachers (Mercer and Davie, 2002). Woods & Ebersole (2003) asserted that a feeling of intimacy and belonging among the learners in the learning environment will result in more opportunities for collaboration activities where co-construction of knowledge may occur. The importance of socialization is further advocated by Knoll and Jarvenpaa (1995) in their study of globally dispersed teams equipped with only email.

Benbunan-Fich and Hiltz (1999) suggested several reasons in which collaboration can support the development of advanced mental models. Firstly, team members can monitor individual thinking and provide feedback for clarification (Dillenbourg & Schneider, 1994). Secondly, the exposure to alternative perspectives challenges understanding and renders motivation for learning (Glasser & Bassok, 1989). Thirdly, cooperation and teamwork provide social support and encouragement (Alavi, 1994; Webb, 1982). Hundreds of other studies have also demonstrated that learning is most effective when students work in groups, challenge the ideas of co-learners, and collaborate to achieve group solutions to problems (Johnson and Johnson, 1989).

### ***2.2 Technology and social presence***

Immediacy, a related concept to social presence, refers to “communication behaviors which enhance closeness to and nonverbal interaction with one another” (Mehrabian, 1969, p. 203). Although Mehrabian’s work acknowledged that verbal behaviors may contribute to perceptions of immediacy, it deals primarily with nonverbal behaviors, such as body language and tone of voice.

Communication theorists argue that the absence of socio-emotional cues is particularly salient in text-based groupware. Established theories of media richness (Daft and Lengel, 1986) and social presence (Short et al., 1976) suggested that different media convey different social cues. Social presence is the degree to which a medium is perceived as conveying the presence of the communicating individuals (Short et al., 1976). Text-based CMC, with its absence of paraverbal and nonverbal cues that carry the rich and differentiated emotional information available in FtF settings, will seriously constrain socio-emotional activities (Short et al., 1976). These cues are related to the forming and maintaining of relationships among participants and are important in facilitating turn-taking, regulating the flow or order of a conversation and affective communication (Short et al., 1976; Shim et al., 2002). Within the educational settings, Garrison et al. (2000) defined social presence as “the ability of participants in a community of inquiry to project themselves socially and emotionally, as ‘real’ people (i.e., their full personality), through the medium of communication being used”

(p. 94). In one study which uses social presence as the theoretical framework to examine students' satisfaction with online learning, results revealed that social presence contributed to about 60% of learners' satisfaction (Gunawardena & Zittle, 1997). In comparison with fTf, text-based CMC is extremely low in social presence (Walther, 1992), resulting in a sense of depersonalization (Hiltz, 1986).

However, Walther (1992) asserted that social presence is likely a subjective perception of a medium's capabilities, rather than a defining attribute of a medium. Previous studies demonstrated that users developed an electronic paralanguage to compensate for the missing, nonverbal intimacy cues by encoding these social contextual cues in textual form (e.g., Gunawardena & Zittle, 1997; Rourke and Anderson, 2002).

Social Information Processing Theory (SIP; Walther, 1992) suggests that relational intimacy may take longer to develop in computer-supported groups, as time is needed to read and reply to messages (Chidambaram, 1996). Walther (1996) suggested that CMC does not differ from fTf communication in terms of the substance, but rather in terms of a slower rate of transfer. For instance, Walther and Burgoon (1992) found that many of the relational dimensions of CMC groups eventually approximated those of fTf over time.

### **2.3 Gender**

In traditional environment, communication styles were found to differ by gender. Females tend to display more socio-emotional behavior, non-aggressive strategies, and interdependent language (Duran and Carveth, 1990; Tannen, 1994; Carli, 1989). In contrast, males are typically associated with task-oriented and aggressive, instrumental strategies, more apt to voice their opinions in a stronger manner, and express independence (Duran and Carveth, 1990; Tannen, 1994; Carli, 1989).

Studies of gender-related patterns in epistemological knowledge demonstrated that female students tend to view learning from a connected and relational path, rather than individualistic perspective (Baxter-Magolda, 1992). It was also found that females performed better than males in mixed-gender online courses (McSporran & Young, 2001; Young et al., 1999).

Analysis of written dialogue discourse in CMC consistently reveals gender variations in contribution style. The study of Herring (1993) revealed that messages of females were punctuated with "attenuated assertions, apologies, questions, personal orientation and support", whereas characteristics of male's language include "strong assertions, self-promotion, rhetorical questions, authoritative orientation, challenges and sarcasm" (p. 7). This evidence is further supported by Blum (1997) in her study of asynchronous CMC. Geffen & Straub (1997), in their study of email, found that females perceived a higher social presence and usefulness, as compared to males.

Savick et al. (1996a, 1996b), in their investigation of interaction patterns in same and mixed-gender groups within CMC context, also found typical gender-linked communication styles. Savick et al. (1996a) observed three-week email-discussion groups, with the task being a feminine-content decision-making task; they found that female-only groups used more individually-oriented and no coarse language. On the other hand, male-only groups used coarser and less individually-oriented language. The expected stereotyped gendered interaction was echoed in another study (Savicki et al., 1996b), conducted over a four-week period. In the latter study (Savicki et al., 1996b), group activities consisted of working

towards a feminine-oriented task and a masculine-content, intellectual task. Female-only groups were found to show significantly higher number of messages characterized by self-disclosure and self-referent, in comparison to male-only groups. Also, females were found to be more satisfied and indicated a higher level of group development than males.

### 3. Research model and hypotheses

Figure 1 depicts the research model.

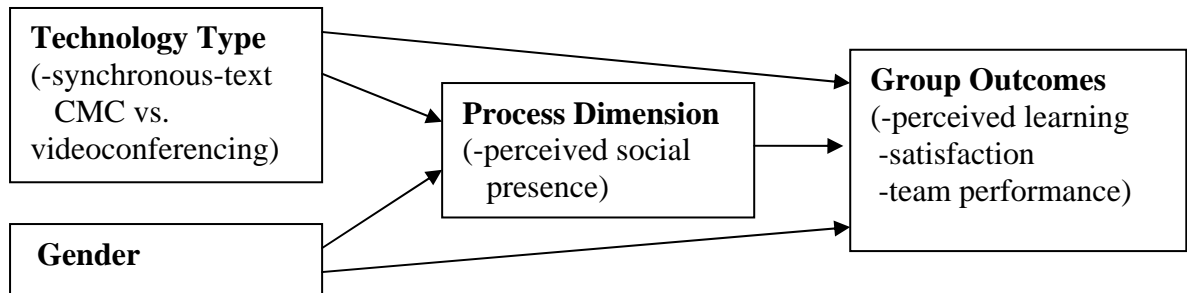


Figure 1. Research model

#### 3.1 Social Presence

When social presence is enhanced, a learning environment that is perceived as warmer and more approachable by the learners is created (Rourke et al., 1999). When team members perceive the “presence” of others and feel that they are part of the group *socially*, they may experience greater group cohesion, which may result in members contributing more to the discussions. According to Gunawardena (1995), collaborative knowledge construction arises through social negotiation, and in order to promote such learning, participants must be able to relate to each other, share a sense of community and work towards a common goal. Given the significance of social interaction in learning (Vygotsky, 1962; Hiltz, 1994), the use of emotional language as a component in assessing social presence (Garrison et al., 2000) and the importance of social presence as a factor related to a feeling of community (Rovai, 2002), this leads to the following hypothesis regarding the relationship between the perception of social presence and learning.

**H1a:** Perceived social presence will significantly correlate with perceived learning.

Higher levels of social presence may thus result in a more positive learning environment, which propagates towards greater knowledge co-construction activities and satisfaction associated with the learning process.

**H1b:** Perceived social presence will significantly correlate with satisfaction.

Furthermore, the establishment of a sense of community or connectedness among learners is essential to optimize learning benefits (Woods and Ebersole, 2003) and may lead to task accomplishment (Gunawardena, 1995). Therefore, we hypothesize that:

**H1c:** Perceived social presence will significantly correlate with team performance.

#### 3.2 Technology

The social presence theory predicts that the degree of social presence of different media is determined by the ability to which a medium conveys social contextual cues. This suggests that the absence of paraverbal and nonverbal cues (e.g., tone of voice) in text-based CMC

may affect transmission of messages, effective turn-taking and subsequently constrain socio-emotional activities and resulted in inadequate transfer of rich, affective information exchange essential for effective task completion. Research has demonstrated that the high number of non-verbal cues conveyed by videoconferencing affects collaboration, in which an enhanced perception of social presence resulted, in comparison with text-based CMC. Although other research has shown that perceived social presence is a subjective attribute and that asynchronous CMC has been found to support nonverbal cues as well as socio-emotional content (e.g., Rourke & Anderson, 2002; Gunawardena & Zittle, 1997), additional effort, time and experience may be required by participants to synchronize the communication activity and express the lack of social contextual cues in written language. Furthermore, as postulated by SIP (Walther, 1992), relational intimacy in CMC may take a longer time to develop. This leads to the following hypothesis:

**H2a:** Videoconferencing groups will report a higher level of perceived social presence than synchronous-text CMC groups.

From previous studies conducted in traditional classroom environment, immediacy behavior (typically associated with nonverbal cues) was found to have increased motivation, affective learning, and cognitive learning among students (Christophel, 1990; Frymier, 1993). Social presence is maintained and enhanced by feelings of immediacy and intimacy behaviors created in interpersonal interaction (Short et al., 1976; Gunawardena, 1995). As a consequence, it is expected that videoconferencing groups will achieve better learning outcomes than synchronous-text CMC groups.

**H2b:** Videoconferencing groups will report a higher level of perceived learning than synchronous-text CMC groups.

**H2c:** Videoconferencing groups will report a higher level of satisfaction than synchronous-text CMC groups.

Given the positive effects of perceived social presence on learning outcomes, it is reasonable to conjecture a corresponding rise in team performance.

**H2d:** Videoconferencing groups will report better team performance than synchronous-text CMC groups.

### **3.3 Gender**

Based on evidence presented in previous research, there is a tendency for females CMC users to invoke socio-emotional linguistic features. The oral discourse (Geffen & Straub, 1997) and attitudinal differences between the genders suggest that, in comparison to men, women are more inclined toward a stronger sense of social presence.

**H3a:** Female groups will report a higher level of perceived social presence than male groups.

Prior research has pointed out that socialization and affective interaction are critical elements in the learning process (e.g., Vygotsky, 1962; Hiltz, 1994), and that the use of emotional expression, humor and self-disclosure contributes to perception of social presence (Garrison et al., 2000). In this study, we argue that gender's influence on performance and other learning outcomes is related to the degree of social presence. Accordingly, it is hypothesized that:

**H3b:** Female groups will report a higher level of perceived learning than male groups.

**H3c:** Female groups will report a higher level of satisfaction than male groups.

Additionally, females adopt a more positive attitude towards teamwork and cooperative learning, as compared to males. Earlier studies in mixed gender online courses have also indicated that females tend to achieve better grades than males. Coupling this with the idea that a higher level of social presence should contribute to greater team performance, the following hypothesis is put forth.

**H3d:** Female groups will report better team performance than male groups.

#### **4. Research methodology**

A laboratory experiment with a 2x2 factorial design was conducted, consisting of technology type (videoconferencing vs. synchronous-text CMC) and gender (female vs. male).

##### **4.1 Subjects**

Sixty students (30 males and 30 females) from a large university were recruited; they were formed into five three-member (same gender) groups for each experimental condition. Gender dimension aside, each subject was randomly assigned to either the videoconferencing or synchronous chat condition. All subjects were naive to the purposes of the study. Each participant was paid \$10.

##### **4.2 Measures of dependent variables**

The perceptual measures (perceived learning, perceived social presence, and satisfaction) were assessed using questionnaire items adapted from previous studies (Alavi, 1994; Short et al., 1976; Burke & Chidambaram, 1999; Khalifa et al., 2002). Perceived learning reflects self-reported learning; it includes items related to the understanding of basic concepts, learning of facts, and the identification of central issues. Perception of social presence measures participants' evaluations of the extent to which the medium is considered hot, personal, sensitive, emotional, expressive, close, and humanizing. The satisfaction scale evaluates students' satisfaction with the learning process and is measured using three items (e.g., satisfaction with the quality of his/her contributions). To evaluate team performance, a quiz that measures the understanding of the learning task was administered to the subjects.

##### **4.3 Experimental task and procedures**

The task involved the identification of various categories of mushroom: poisonous, cultivated and edible. The nature and content of the learning material were adapted from Cooper & Stone (1996). The task incorporated important elements vis-à-vis learning.

Group members were seated in a manner that did not permit direct line of sight or communication; this was important in simulating a distributed learning environment. The experimental session took about an hour; this time duration was arrived at via a small-scale pre-test.

All subjects were briefed on the experimental aspects and were requested to read through the instructions. They completed a pre-experiment questionnaire (demographic data). Subjects were told to read through the task and to learn as much as they could about the mushrooms. Subjects were then requested to complete the quiz questions individually prior to discussing with their groups. Upon completion of the quiz, each participant went through the necessary



steps on using the collaboration software. Thereafter, group discussion commenced. Via the assigned technology, group members interacted and came to a consensus on the answers for the quiz. Upon completing the task, subjects were administered with post-experiment questionnaires on perceptual measures.

## **5. Data analysis and results**

Demographics characteristics were analyzed to detect differences between the participants in the conditions. No significant difference was found in terms of age and prior experience with the assigned technology. The reliability coefficients for perceived learning (.72), satisfaction (.71), and social presence (.86) were found acceptable (Nunnally, 1978).

Standard direct entry regression analysis was utilized to test the relationship between social presence and learning outcomes. Results revealed that groups with higher perceived social presence had higher perceived learning ( $r=0.44$ ,  $p=0.00$ ), giving support to H1a. As predicted, groups with higher perceived social presence had greater satisfaction ( $r=0.40$ ,  $p=0.00$ ), thus supporting H1b. However, data analysis did not support the hypothesis that perceived social presence is significantly correlated with team performance ( $r=0.12$ ,  $p=0.61$ ). H1c is not supported.

Analysis of variance (ANOVA) was conducted to test for main effects due to gender and technology type on learning outcomes and social presence. No significant differences were detected. Hence, hypothesis sets 2 and 3 were not supported.

## **6. Discussion**

### ***6.1 Social Presence***

Results revealed that social presence is significantly correlated with both satisfaction and perceived learning. This piece of finding is in line with previous research conducted in traditional settings, which found that immediacy behavior – a closely related concept of social presence – is positively related to learning (e.g., Kelly and Gorham, 1998; Christophel, 1990). For instance, the study of Christophel (1990) revealed that positive relationships exist between immediacy behavior, and cognitive and affective learning. Likewise, our results echo those of Gunawardena and Zittle (1997), who found that social presence contributed to about 60% of learners' satisfaction in a computer conferencing environment. According to Rovai (2002), social presence is an important aspect that contributes to a feeling of community among learners in distance education. Also, a sense of community, belonging and intimacy among learners in the virtual environment help encourage collaborative learning and prevent feelings of isolation and frustration (Mercer and Davie, 2002; Woods and Ebersole, 2003). In sum, enhanced social presence leads to increased perceived learning and satisfaction. Consistent with the collaborative-constructive perceptions of learning, the results in this study also support prior research that collaboration among peers will increase shared knowledge and critical thinking, mediated through social interaction and the use of technology (Mercer and Davie, 2002; Vygotsky, 1962; Hiltz, 1994).

These empirical results highlight social presence as an important and integral element that will influence knowledge co-construction and satisfaction in the learning process. Indeed, a fuller understanding of the important role played and playable by social presence in the context of virtual learning is warranted.

Contrary to predictions, a statistically non-significant correlation between social presence and group performance in synchronous-text CMC and VC groups was found. Druskat & Kayes (2000), in their study of project teams in traditional environment, suggested that the reflection and discussion required for team learning may be reduced in short-term project teams with a tight deadline and where efficiency is paramount (Edmondson, 1999). For teams with performance as their primary focus, the social interaction and learning aspects would thus be neglected. This further suggests that the criteria to meet deadlines may reduce the positive benefits of collaboration learning (Druskat & Kayes, 2000). This may partially explain why the relationship between social presence and team performance was negligible, despite its significant correlations with perceived learning and satisfaction.

### **6.2 Technology**

Findings indicated that learning outcomes did not differ significantly between VC and synchronous-text CMC groups. We attribute this to the lack of significant difference on social presence – to the extent that the technologies could make a difference on social presence, differences in learning outcomes would also transpire. This argument is supported by our finding on the significant association between social presence and learning outcomes. In contrast to Short's concept of social presence (1976), which suggested that text-based CMC would constraint socio-emotional content, analysis showed that social presence is not determined solely by the media, a situation that is reflected in the findings of other research. Gunawardena and Zittle (1997) and Rourke & Anderson (2002) found that CMC learning environment is perceived by students as one that supports social interaction. In fact, a large body of research has shown that groups were able to use the affordances of the CMC system, such as emoticons, language, to replace missing nonverbal cues (e.g., Davis & Bewer, 1997; Gunawardena & Zittle, 1997). The visual images of other collaboration members are hence not necessary to create a sense of presence.

### **6.3 Gender**

The findings do not support the underlying premise in this current study, in that females engage in more socio-emotional behavior, and hence achieve better learning outcomes, than male-only teams. This contradicts with previous research studies (e.g., Savicki et al., 1996a, 1996b; Herring, 1993), which found gender differences in socio-emotional language. We raise three elements – culture, time, and group size – in addressing the seeming contradiction.

Previous research indicated culture as a moderating factor affecting gender differences (Mortenson, 2002). In individualistic cultures, people tend to be opinion-oriented and straight-forward (Ting-Toomey, 1992), whereas in collectivistic cultures, personal relationship prevails over task (Chang and Lim, 2002). Countries such as Canada and USA are typically associated with individualistic cultures, while most Asian countries, such as Singapore and Taiwan, are inclined towards collectivism (Hofstede, 1980). In one study conducted in traditional environment, Mortenson (2002) found that the typical gendered behavior was only supported in Euro-American subjects. Males were as likely as females in using supportive modes of communication in the Asian sample (Mortenson, 2002). Watkins et al. (1998) discovered that the gender stereotypes, with females valuing social relationships more, apply only to individualistic western countries. Gender effects may thus become salient only in individualist cultures, while collectivism operates as a moderating factor affecting gender behavior, even in online settings. In the current study, all subjects consisted of Asians.

Second, unlike the studies of Savicki et al. (1996a, 1996b) which were conducted over a few weeks, the current study was carried out in single sessions. Past empirical studies performed

in traditional environments revealed that time limitations and deadlines imposed affected the behavior of team members (Druskat and Kayes, 2000; Gersick, 1988, 1989), suggesting that time may have moderated gender effects.

Lastly, the current study involved small groups (three members), rather than larger groups (six-member groups were utilized by Savicki et al., 1996b). According to Johnson et al. (1996), the communication style is affected by the group size: the smaller the group, the greater the load on members to keep the conversation going.

#### **6.4 Limitations**

The number of groups per treatment condition used for this study is only 5 and a total of only 60 subjects were employed. Thus, the relatively small size and statistical power of this experimental study might hamper the generalization of the findings.

Second, the results must be understood in light of the larger educational context. Majority of the subjects were Computer Science students who were very experienced with the equipment. This may pose a limitation when attempting to address people with little or no technical experience.

In a meta-analysis pertaining to the effect of IT on learning outcomes (Lim & Chang, 2003), it was shown that the effects on learning may be moderated by differences in Western and Eastern cultures. Since the subjects used in this experiment were all Asians, the results might not be directly applicable to another culture.

#### **6.5 Implications and Future Research**

The findings suggest several important implications which should be taken into account when organizing a virtual learning team. First, the perception of collaborative learning and satisfaction is not affected by the technology type. It seems that synchronous-text CMC is as well-suited as videoconferencing in terms of learning activities. The results further suggest that perceived social presence is a necessary antecedent of perceived learning and satisfaction. Instructors should thus seek and incorporate appropriate actions to enhance perception of social presence. In the same vein, greater attention should be paid to the design features of the collaborative technology to further improve the social and emotional experience of the distance learner.

Several issues deserve further exploration. Future research should examine more closely group processes which influence learning outcomes in distance learning groups. Druskat and Kayes (2000), in their study of group processes in short-term fTf project teams, found that team processes were predictive of team learning. Could these findings be extended to the text-based CMC and VC learning settings? The influence of time pressure on team processes and learning outcomes in various distance learning environments should also be examined.

Social-contextual models of gender emphasize the importance of contexts and activity settings (e.g., school vs. work) in understanding gender differences and similarities (Strough & Covatto, 2002). Future work should look into comparing the moderating effects of contexts, including culture, time span, and group size, within the online learning environment.

### **7. Conclusion**

Virtual learning teams are increasingly prevalent as universities seek to take advantage of the flexibility and ability afforded by the accompanying technology to team up various people

across the globe for collaborating learning; this is something unfathomable with the face-to-face setting. This paper has reported on an exploratory study to gain knowledge about certain facets pertaining to virtual learning; in particular, it sought to address roles of potentially important factors. We found social presence to be a critical element that cannot be discounted in the design of instructional strategies in order to achieve enhanced perceived learning and satisfaction. Additionally, results show that social presence is not determined entirely by the media. Rather, online learners could compensate for the absence of social contextual cues and visual images through the usage of the affordances of textual CMC, such as emoticons and paralanguage, to foster a sense of “presence”. In contrast to previous studies, which indicate that the overall perceived social presence and social-emotional content pertaining to females are higher than those pertaining to males, our findings suggest otherwise. Contextual variables, such as culture, must be taken into consideration in addressing the effects of gender on learning outcomes.

## References

- Alavi, M. “Computer-Mediated Collaborative Learning: An Empirical Evaluation,” *MIS Quarterly* (18:2), 1994, pp. 150-174.
- Alavi, M. & Leidner, D.E. “Research Commentary: Technology-Mediated Learning-A Call for Greater Depth and Breadth of Research,” *Information System Research* (12:1), 2001, pp. 1-10.
- Anderson, T.D., & Garrison, D.R. “Learning in a Networked world: New Roles and Responsibilities,” in *Distance Learners in Higher Education*, C. C. Gibson (Ed.), Madison, Wisconsin: Atwood, 1998, pp. 97-112.
- Baxter-Magolda, M.B. (1992). *Knowing and Reasoning in college: Gender-Related Patterns in Student’s Intellectual Development*, San Francisco: Jossey-Bass Publishers.
- Benbunan-Fich, R. & Hiltz, S.R. “Impacts of Asynchronous Learning Networks on Individual and Group Problem-solving: A Field Experiment,” *Group Decision and Negotiation* (8), 1999, pp. 409-426.
- Berge, Z. “Computer Conferencing and the Online Classroom,” *International Journal of Educational Telecommunications* (3:1), 1997, pp. 3-21.
- Blum, K.D. “Gender Differences in CMC-Based Distance Education,” *Feminista* (2:5), 1997.
- Blum, K.D. “Gender Differences in Asynchronous Learning in Higher Education: Learning Styles, Participation Barriers and Communication Patterns,” *JALN* (3:1), 1999, pp. 46-66.
- Bullen, M. “Participation and Critical Thinking in Online University Distance Education,” *Journal of Distance Education* (13:2), 1998, pp. 1-32.
- Burke, K. & Chidambaram, L. “How Much Bandwidth is Enough? A Longitudinal Examination of Media Characteristics and Group Outcomes,” *MIS Quarterly* (23:4), 1999, pp. 557-580.
- Carli, L. “Gender Differences in Interaction Style and Influence,” *Journal of Personality and Social Psychology* (56), 1989, pp. 565 -76.
- Chang, T. & Lim, J. “Cross-Cultural Communication and Social Presence in Asynchronous Learning Processes,” *e-Service Journal* (1:3), 2002.
- Chidambaram, L. “Relational Development in Computer Supported groups,” *MIS Quarterly* (20), 1996, 142-165.
- Christophel, D. “The Relationships Among Teacher Immediacy Behaviors, Student Motivation, and Learning,” *Communication Education* (39), 1990, pp. 323-340.
- Cooper, J. & Stone, J. “Gender, Computer-Assisted Learning and Anxiety: With a Little Help from a Friend,” *Journal of Educational Computing Research* (15:1), 1996, pp. 67-91.

- Daft R.L. & Lengel, R.H. "Organizational Information Requirements, Media Richness and Structural Design," *Management Science* (32:5), 1986, pp. 554-571.
- Davis, B.H. & Brewer, J. P. *Electronic Discourse: Linguistic Individuals in Virtual Space*, Albany, NY: State University of New York Press, 1997.
- Dillenbourg, P. & Schneider, D. "Collaborative Learning and the Internet," *Proceedings of the Fourth International Conference on Computer Assisted Instruction*, Taiwan, S10-6 to S10-13, 1994.
- Druskat, V.U., & Kayes, D.C. "Learning versus Performances in Short-term Project Teams," *Small Group Research* (31:3), 2000, pp. 328-353.
- Duran, R.L. and Carveth, R.A. "The Effects of Gender-Role Expectations upon Perceptions of Communicative Competence," *Communication Research Reports* (7:1), 1990, pp. 25 - 33.
- Edmondson, A. "Psychological Safety and Learning Behavior in Work Teams," *Administrative Science Quarterly* (44:2), 1999, pp. 350-383.
- Fisher, K., Phelps, R. & Ellis, A. "Group Processes: Teaching, Collaboration through Collaborative Processes," *Educational Technology and Society* (3:3), 2000.
- Frymier, A.B. "The Impact of Teacher Immediacy on Students' Motivation over the Course of a Semester," Paper presented at the Annual Meeting of the Speech Communication Association (Miami Beach), (ED 367 020), 1993.
- Garrison, R., Anderson, T., & Archer, W. "Critical Inquiry in a Text-Based Environment: Computer Conferencing in Higher Education," *The Internet and Higher Education* (2:2), 2000, pp.87-105.
- Gefen, D. & Straub, D.W. "Gender Differences in the Perception and Use of E-mail: an Extension to the Technology Acceptance Model," *MIS Quarterly* (21:4), 1997, pp. 389-400.
- Gersick, C.J.G. "Time and Transition in Work Teams: Towards a New Model of Group Development," *Academy of Management Journal* (31:1), 1988, pp. 4-41.
- Gersick, C.J.G. "Marking Time: Predictable Transitions in Task Groups," *Academy of Management Journal* (32:2), 1989, pp. 274-309.
- Glasser, R. & Bassok, M. "Learning Theory and the Study of Instruction," *Annual Review of Psychology* (40), 1989, pp. 631-666.
- Gunawardena, C.N. "Social Presence Theory and Implications for Interaction and Collaborative Learning in Computer Conferences," *International Journal of Educational Telecommunication* (1:2/3), 1995, pp. 147-166.
- Gunawardena, C.N., & Zittle, F.J. "Social Presence as a Predictor of Satisfaction within a Computer-mediated Conferencing Environment," *The American Journal of Distance Education* (11:3), 1997, pp. 8-26.
- Gunn, C., McSparran, M., Macleod, H. & French, S. "Dominant or Different? Gender Issues in Computer Supported Learning," *JALN* (7:1), 2003.
- Herring, S. C. "Gender and Democracy in Computer-Mediated Communication," *Electronic Journal of Communication* (3:2), 1993, pp. 1-16. Retrieved December 05, 2003, from <http://www.usyd.edu.au/su/social/papers/herring.txt>
- Herring, S.C. "Interactional Coherence in CMC," *Proceedings of the 32<sup>nd</sup> Hawaii International Conference on System Sciences (HICSS)*, 1999.
- Hiltz, S.R. "Teaching and Learning on-line: Issues in Computer-Mediated Graduate Courses," *Canadian Journal for Educational Communication* (36:2), 1986, pp. 95 -104.
- Hiltz, S.R. *The Virtual Classroom: Learning without Limits via Computer Networks*, Norwood, NJ USA: Ablex Publishing Corporation, 1994.
- Hofstede, G. "Culture's Consequences: International Differences in Work-Related Values," Newbury Park, CA: Sage, 1980.

- Jason, R. & Bruce, K. "Distance Learning: The Current State of Distance Learning and How Well It Maps to Educational Learning Models," 2001. Retrieved August 23, 2003, from <http://www.unf.edu/~ritj0003/term/term.htm>
- Johnson, C., Clay-Warner, J. & Funk, S.J. "Effects of Authority Structures and Gender on Interaction in Same-Sex Task Groups," *Social Psychology Quarterly* (59:3), 1996, pp. 221-236.
- Johnson, D.W., & Johnson, R.T. *Cooperation and Competition: Theory and Research*, Edina, MN: Interaction Book Company, 1989.
- Kelly, D.H., & Gorham, J. "Effects of Immediacy on Recall of Information," *Communication Education* (37), 1988, pp. 198-207.
- Khalifa, M., Chi-Wai, K. & Davison, R. "The Effects of Process and Content Facilitation Restrictiveness on GSS-Mediated Collaborative Learning," *Group Decision and Negotiation* (11:5), 2002, pp. 345-361.
- Knoll, K. & Jarvenpaa, S.L. "Learning to Work in Distributed Global Teams," *Proceedings of the 28th Hawaii International Conference on System Sciences (HICSS)*, 1995.
- Lim, J. & Chang, T. "A Meta-Analysis of the Effect of IT on Learning Outcomes," *Paper Presented at the Proceedings of the 2003 Information Resources Management Association (IRMA) International Conference*, 2003.
- McLean, S. & Morrison, D. "Sociodemographic Characteristic of Learners and Participation in Computer Conferencing," *Journal of Distance Education* (15:2), 2000.
- McSporrán, M. & Young, S. "Does Gender Matter in Online Learning?" *Association for Learning Technology Journal (Alt-J)* (9:2), 2001, pp. 3-15. Retrieved November 21, 2003, from We Site: [http://hyperdisc.unitec.ac.nz/research/ALTJpaper\\_9.pdf](http://hyperdisc.unitec.ac.nz/research/ALTJpaper_9.pdf)
- Mehrabian, A. "Some Referent and Measures of Nonverbal Behavior," *Behavioral Research Methods and Instrumentation* (1), 1969, pp. 213-217.
- Mercer, D. & Davie, L. "Effective Collaboration for Group Projects: The Value of Synchronicity," *Paper presented at TCC*, 2002. Retrieved August 23, 2003, from <http://makahiki.kcc.hawaii.edu/tcc/tcon02/presentations/mercerc.html>
- Mortenson, S. T. "Sex, Communication, and Cultural Values: Individualism-Collectivism as a Mediator of Sex Differences in Communication in Two Cultures," *Communication Reports* (15:1), 2002.
- Murphy, K.L., & Collins, M.P. "Development of Communication Conventions in Instructional Electronic Chats," *Journal of Distance Education* (12:1/2), 1997, pp. 177-200.
- Nunnally, J. *Psychometric Theory*, New York: McGraw Hill, 1978.
- Ocker, R.J. & Yaverbaum, G.J. "Asynchronous Computer-Mediated Communication versus Face-to-Face collaboration: Results on Student Learning Quality and Satisfaction," *Group Decision and Negotiation* (8:5), 1999, pp. 427 -440.
- Renee, R. "Gender Issues in Teaching: Does Nurturing Academic Success in Women Mean Rethinking Some of What We Do in the Classroom?" *Stanford University Newsletter on Teaching* (6:1), 1994. Retrieved Feb 18, 2004, from Stanford Web Site: <http://ctl.stanford.edu/teach/speak/stfall94.pdf>
- Rourke, L. & Anderson, T. "Exploring Social Communication in Computer Conferencing," *Jl. of Interactive Learning Research* (13:3), 2002, pp. 259-275.
- Rourke, L., Anderson, T. & Garrison, D.R. "Assessing Social Presence in Asynchronous-text-Based Computer Conferencing," *Journal of Distance Education* (14.2), 2001.
- Rovai, A. P. "Building a Sense of Community at a Distance," *IRRODL*, Apr, 2002.
- Sanders, J., & Wiseman, R. "The Effects of Verbal and Nonverbal Teacher Immediacy on Perceived Cognitive, Affective, and Behavioral Learning in the Multicultural Classroom," *Communication Education*, 39, 1990, pp. 341-353.

- Savicki, V., Kelly, M. & Lingenfelter, D. "Gender and Group Composition in Small Task Groups using Computer-Mediated Communication," *Computers in Human Behavior* (12:2), 1996a, pp. 209-224.
- Savicki, V., Kelly, M., & Lingenfelter, D. "Gender, Group Composition and Task Type in Small Task Groups Using Computer-Mediated Communication," *Computers in Human Behavior* (12:4), 1996b, pp. 549-565.
- Shim, J.P., Warkentin, M., Courtne, J. F., Daniel J.P., Sharda,R. & Carlsson ,C. " Past, Present, and Future of Decision Support Technology," *Decision Support Systems* (33:2), 2002, pp. 111-126.
- Short, J., Williams, E. & Christie, B. *The Social Psychology of Telecommunications*, Toronto: John Wiley and Sons, 1976.
- Smith O.R. "*Learning in Virtual Teams: A Summary of Current Literature*," 2000. Retrieved Nov 7, 2003, from <http://www.msu.edu/~smithre9/Project12.htm>
- Snizek, J.A. & Crede, M. "Group Judgment Processes and Outcomes in Videoconferencing vs. Face-to-Face Groups," *Proceedings of the 35th Annual Hawaii International Conference on System Science (HICSS)*, 2002.
- Spencer, D.H. & Hiltz, S.R. "A Field Study of Use of Synchronous Chat in Online Courses," *Proceedings of the 36th Annual Hawaii International Conference on System Science (HICSS)*, 2003.
- Spender, D. *Invisible Women*, London: The Women's Press, 1982.
- Sproull, L. & Keisler, S. "Reducing Social Context Cues: Electronic Mail in Organizational Communication," *Management Science* (32), 1986, pp. 1492- 1513.
- Strough, J. & Covatto, A.M. "Context and Age Differences in Same-and Other-Gender Peer Preferences," *Social Development* (11), 2002, pp. 346-361.
- Tannen, D. "*Talking from 9 to 5*," New York: William Morrow and Company, 1994.
- Ting-Toomey, S. "*Cross-Cultural Face-Negotiation: An Analytic Overview*," April 1992. Retrieved November 24, 2003, from <http://www.cic.sfu.ca/forum/ting-too.html>
- Vygotsky, L.S. *Thought and Language*, Cambridge, MA: MIT Press, 1962.
- Walther, J.B. "Interpersonal Effects on Computer-Mediated Interaction: A Relational Perspective," *Communication Research* (19:1), 1992, pp. 52-90.
- Walther, J.B. "Computer-Mediated Communication: Impersonal, Interpersonal and Hyperpersonal Interaction," *Communication Research* (23:1), 1996, pp. 3-43.
- Walther, J.B., & Burgoon, J.K. "Relational Communication in Computer-Mediated Interaction," *Human Communication Research* (19), 1992, pp. 50-88.
- Watkins D.A., Adair J., Akande A., Cheng C., Fleming J., Gerong A., Ismail M., McInerney D., Lefner K., Mpofo E., Regmi M., Singh-Sengupta S., Watson S., Wondimu H. and Yu J. "Cultural Dimensions, Gender and the Nature of Self-Concept: A Fourteen-Country Study," *International Journal of Psychology* (33:1), 1998.
- Webb, N.M. "Student Interaction and Learning in Small Groups," *Review of Educational Research* (52), 1982, pp. 421-445.
- Woods, R. & Ebersole, S. "Social Networking in the Online Classroom: Foundations of Effective Online Learning," *EJournal* (12/13:1), 2003.
- Young, S., Dewstow, R. & McSporran, M. "Who Wants to Learn Online? What Types of Students Benefit From the New Learning Environment," *Proceedings of NACCCQ*, July 1999.