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ONLINE SOCIAL PRESENCE
A Study of Score Validity of the Computer-Mediated Communication Questionnaire

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The purpose of this study was to conduct a confirmatory factor analysis of the Computer-Mediated Communication Questionnaire scores, using structural equation modeling, to assess the consistency between the empirical data and the hypothesized factor structure of the CMCQ in the proposed models, which is stipulated by the theoretical framework and previous research. Online social presence is a vital affective learning factor that influences online interaction. In this study, online social presence was defined as the degree of feeling, perception, reaction, and trustworthiness of being connected by computer-mediated communication to another intellectual entity through electronic media. Currently, valid instruments to determine the degree of social presence felt and exhibited by online learners are wanting. The results of this study indicated that online social presence was multidimensional, and composed of 4 factors as hypothesized in the theoretical framework: social context, online communication, interactivity, and privacy, although revision of some test items was also suggested by the results.

INTRODUCTION

Online social presence is a vital affective and cognitive learning factor that influences online interaction (Gunawardena & McIsaac, 2003). It is the degree of feeling, perception, and reaction of being connected by computer-mediated communication (CMC) to another intellectual entity through electronic media (Tu & McIsaac, 2002). Social presence in face-to-face contact is supported by physical presence in additional to social interaction. In an online environment, physical presence is removed. If one does not engage in social interaction purposefully, online social presence is likely to be minimal or absent. It is risky for one to take for granted that all online participates have social presence if they are just "being there," and not participating any online activities.

In fact, recently researchers have argued that lack of physical presence may not be a blockade to improving social presence. Rogers and Lea

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(2005) concluded that lack of physical presence can be an advantage to improving social presence in online distributed learning by emphasizing social identities rather than personal identities. Presently, researchers have focused on emulating physical presence and increasing number of sensory stimuli to enhance levels of social presence in online environments. In addition, Rogers, and Lea concluded that shared group identity, applying online collaboration, and assisting group members to develop coherent personal goals and group goals, is critical to improving online social presence.

Studies have indicated the relationships between social presence, and various aspects in online learning. Based on media comparison studies, teacher social presence was positively related to quality of knowledge acquisition (Weidenmann, Paechter & Schweizer, 2000), perceived learning, perceived satisfaction (Richardson & Swan, 2003; Russo & Benson, 2005), and student-perceived learning achievement (Russo & Benson; Shin, 2003). Additionally, Polhemus, Shih, and Swan (2001) found that a high degree of social presence would initiate and maintain a greater quantity of interactions and promote deeper interactions. De Bruyn (2004) agreed with this finding by concluding that social presence was an indicator for higher responsive and interactive discussions in an inquiry-based learning activity; however, the social presence would be negatively related to degree of frustration, critical attitude of the instructor's effectiveness (Rifkind, 1992), and affective learning (Hample & Dallinger, 1995). In fact, level of instructor's social presence had a stronger relationship with student satisfaction than perceived presence of peers (Swan & Shih, 2005).

Based on past studies, social presence seems to be an important factor to be considered in online learning. However, an empirically validated instrument is not available for online social presence at this point. The purpose of this study was to conduct a confirmatory factor analysis (CFA) of the scores from an instrument of online social presence, the Computer-Mediated Communication Questionnaire (CMCQ), to gain more insights regarding the score validity of the CMCQ. Specifically, models representing different facture structure underlying the CMCQ scores are tested for the fit to the empirical data. An adequate fit, if any, between the proposed models and the data will shed the light on whether the CMCQ actually measures what it is developed to measure.

Dimensions

Results from the mediated social presence study by Short, Williams, and Christie (1976) were frequently cited in discussions of the social presence theory. In their study, they concluded that social presence was determined by the "quality of the medium." However, this single dimensional proposition did not take into account the individual differences, task, social context, and social relationships among communicators (Biocca, Harms & Gregg, 2001). Biocca et al. and Rettie (2003) argued that Short and his associates simply defined social presence from the dimension of the quality of medium, but failed consider user's social context.

Biocca, Burgoon, Harms, and Stoner (2001), and Danchak, Walther, and Swan (2001) went beyond the unidimensional attributes of the medium, and examined other possible dimensions, such as social relations in social context, and interactive behaviors in online learning environments. These studies identified the factors of online social presence from the perspective of multiple dimensions, attributes of the medium, feelings/experiences of communicators, social relationships, and the virtual behaviors of communicators. Biocca (1997) discussed those critical factors of online social presence as form, behaviors, and sensory in a virtual reality environment.

Theoretical Framework

Based on past research, Tu and McIsaac (2002) identified the elements of online social presence as social context, online community

technology, and interactivity in an online learning environment, then proposed an online social presence framework for an educational learning environment. In a test validation study of the CMCQ developed to measure online social presence, four dimensions of social presence were extracted and named (i.e., social context, online communication, interactivity, and privacy) in the exploratory factor analysis (Tu & Yen, 2006).

"Social context" is regarding the social feelings and experiences of CMC users toward the CMC environment and another intelligent being. Social contexts, such as social form, conveying feeling and emotion, social relationship (Williams & Rice, 1983), and trust relationship (Cutler, 1995; Kumar & Benbasat, 2002), contribute to the degree of social presence. The uniqueness of each individual makes their perceptions of online learning environments differ. Humans are social animals. Learners learn from engaging in social activities; therefore, how well learners perceive the online environment as a social means to allow them build social relationship with others determines their ability to learn. Due to the lack of visual contact in text-based CMC environments, CMC users have to adopt a different social mentality to achieve an ideal trust relationship before any social interaction can occur. In other words, if learners are incapable and/or unable to express their feelings and emotions in an online environment, positive social relationship may not take place at all.

"Online communication" is the users' perception of the use, and attributes of online communication technology, such as e-mail, threaded discussions, and real-time chat. Issues related to the ease for individuals to express the intentions, and their computer keyboard skills will affect the online communication quality. CMC media has two major characteristics absent in other media: synchronicity vs. asynchronicity, and capability of communication channel partition (text, audio, and video). Text-based communications are traditionally used in asynchronous communication media, such as written communication. However, CMC can be conducted either synchronously and/or asynchronously. Communication channel partition is the second unique characteristic in CMC media. For instance, real-time chat can be used both asynchronously and synchronously. As suggested by Stein and Wanstreet (2003), students are able to select different CMC media to collaborate comfortably, and to improve their levels of social presence if provided with synchronicity, and communication channel partition.

"Interactivity" consists of the active communication and learning activities conducted by the CMC users, and their communication styles such as response time (Norton, 1986), and topics (Argyle & Dean, 1965; Walther, 1992). This dimension refers to behavioral reaction as an element of social presence. The potential for feedback from another contributes to the degree of salience of another person in the interaction. Gunawardena (1995) differentiated between interactivity and social presence, and suggested that social presence was more than the awareness of interactivity on the user's part. There was social presence when users noticed (awareness), appreciated (connectedness), and reacted (social presence). As recommended by Gunawardena, social presence should incorporate the dimension of reacting to others as one of its constituents.

"Privacy" in CMC environment refers to how confident of security the users are in the CMC environment. In other words, it is regarding the extent to which users believe CMC is private enough to maintain the confidentiality. Privacy was supported by past research to be a critical factor in influencing social presence (Witmer, 1997). Generally speaking, if one perceives CMC with a high degree of privacy, social presence is more likely to be higher. However, Tu and McIsaac (2002) found that students perceiving the CMC with a low level privacy still demonstrated a high level of social presence. This might be explained as a risk-taking phenomenon (Witmer). Naturally, humans tend to take risks (Tu, 2002b). With more comprehensive study of social presence and, perhaps, the rela-

tionship between social presence and privacy will be more conclusive.

METHOD

Instrument

The CMCQ was revised from its earlier version (Tu, 2002a) to measure the construct of online social presence. Twenty-four CMCQ items were graded on a 5-point Likert scale (1 = *strongly disagree*; 2 = *disagree*; 3 = *uncertain*; 4 = *agree*; 5 = *strongly agree*) to indicate the intensities of a respondent's self-perceived online social presence.

The results in a previous validation study (Tu & Yen, 2006) supported the internal consistency and content validity of the test items in the CMCQ. In addition, four factors (i.e., social context, privacy, interactivity, and online communication) were extracted from the CMCQ scores representing different aspects of online social presence (see Table 1). For the purpose of the current confirmatory factor analysis (CFA) study, only the scores of the test items listed in Table 1 were analyzed.

Participants

Participants (N = 210) were recruited from graduate education programs in one private, urban 4-year institution, and one public, rural 4-year institution. In this convenience sample, participants responded to the CMCQ on a voluntary basis. Majority of the participants were female (n = 154, 73.3%). As to the ethnicity, the group of Caucasian Americans was the predominant one (n = 126, 60.0%) and the Asian American group was the second largest one (n = 45, 21.4%). The rest of the participants were African American (n = 19, 9%), Latino American (n

TABLE 1
CMCQ Test Items Measuring Different Aspects of
Social Presence in the Target Model and Alternative Model 1

Factor	*Item No.*	*Item Content*
Social context		
	1	CMC messages are social forms of communication.
	3	CMC messages convey feeling and emotion.
	16	CMC allows me to build more caring social relationship with others.
	20	CMC permits the building of trust relationships.
Privacy		
	4	CMC is private/confidential.
	18	It is unlikely that someone might obtain personal information about you from the CMC messages.
	24	It is unlikely that someone else might redirect you messages.
Interactivity		
	8	Users of CMC normally respond to messages immediately.
	13	I am comfortable participating, even I am not familiar with the topics.
	23	I am comfortable with the communication styles employed by CMC users.
Online communication		
	10	It is easy to express what I want to communicate through CMC.
	22	My computer keyboard skills allow me to be comfortable while participating in CMC.

Note: In alternative Model 2, all listed test itmes are measuring the factor of social presence.

= 6, 2.9%), Native American (*n* = 3, 1.4%), and other (*n* = 11, 5.2%). The participants were also asked of their computer expertise levels. As a result, 154 (73.3%) of them self-rated as intermediate, 29 (13.8%) as expert, 26 (12.4%) as novice, and 1 as no experience (0.5%).

Data Analysis

The Amos 5.0 program (Arbuckle, 2003) was used to implement the comfirmatory factor analysis (CFA) using structural equation modeling (SEM).

Model Specification

In SEM, a model represents a set of hypotheses regarding relationships among variables, either latent or observed (Klem, 2000). For the current study, the target model, a second-order factor model (see Figure 1), was specified a priori, on the basis of past research (Tu & Yen, 2006), and the conceptual framework (Tu, 2002a), to represent hypothesized factor structure underlying the CMCQ scores. As suggested by researchers (McDonald & Ho, 2002), two alternative models (see Figures 1 and 2) were also specified to compare with the target model.

Model Estimation

In model estimation, optimal estimates of model parameters are found to minimize the discrepancy between the observed variance/covariance matrix and the model-implied variance/covariance matrix (Bentler, 1980). For the current study, the maximum likelihood (ML) method was adopted for parameter estimation due to its robustness against the violation of multivariate normality assumption (Kline, 2005).

Model Fitting

Researchers (Bollen & Long, 1993; Breckler, 1990) suggested that multiple criteria should be adopted to assess the different aspects of model fit. For the current study, the χ^2 goodness-of-fit statistic, the ratio of χ^2 to degrees of freedom, two absolute fit indices—goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), two incremental fit indices (i.e., normed fit index (NFI), and comparative fit index (CFI))—and one population-based fit index—root mean squared error of approximation (RMSEA)—were utilized to assess the model fit of the target model and two alternative model from different perspectives. Moreover, two predictive fit indices—expected cross-validation index (ECVI), and consistent Akaike information criterion (CAIC)—were also used to assess the expected model fit of the target model and two alternative models in samples randomly selected from the same population.

The value of the fitting function and the derived χ^2 value will equal zero, if a model fits the data perfectly. Contrary to traditional hypothesis testing, a statistically significant χ^2 value suggests bad model fit and is not desirable in model fitting (Kline, 2005). The α level was set at .05 for the χ^2 goodness-of-fit test. The ratio of χ^2 to degrees of freedom was also assessed due to the sensitivity of the χ^2 value to sample size (Kline, 2005). A ratio of χ^2 to degrees of freedom as 2 was adopted as the cutoff for an acceptable fit.

GFI is analogous to the squared multiple correlation and indicates the proportion of observed covariance accounted for by the model-implied covariance (Tanaka, 1993). AGFI is obtained by correcting the value of GFI downward for model complexities in terms of degrees of freedom. As a rule of thumb, if the value of the GFI is larger than .90, the model is considered to have a good fit (Kline, 2005). There is no cutoff of an AGFI for an acceptable model fit. Therefore, an AGFI not very different from the GFI indicates a good model fit.

Bentler-Bonett Normed Fit Index (NFI) indicates the proportion of overall model fit improvement relative to the null model which assumes no relationship among observed variables in the population (Kline, 2005). CFI is interpreted the same way as the NFI. If the value of a NFI or the value of a CFI is larger than .90, an acceptable model fit is indicated (Kline).

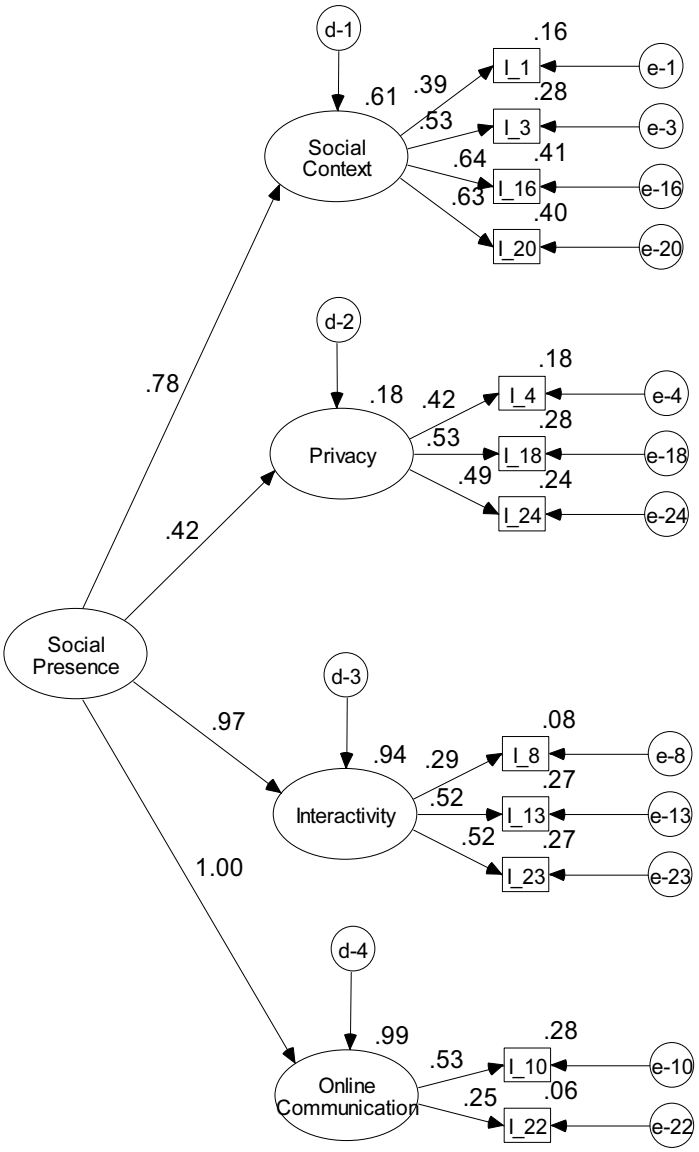

FIGURE 1
Target Model With Standardized Factor Pattern Coefficients

RMSEA, an index of the badness-of-fit of a model, is population-based, and therefore, relatively insensitive to the effect of the sample size (Loehlin, 2004). A value of RMSEA less than .05 indicates a close model fit and a value less than .08 indicates a reasonable model fit (Kline, 2005).

ECVI and CAIC are appropriate indices in the comparison of two nonhierarchical (i.e., nonnested) models and a model with lower values of them will have a better chance to fit the future samples from the same target population equally well as with the current sample (Kline, 2005).

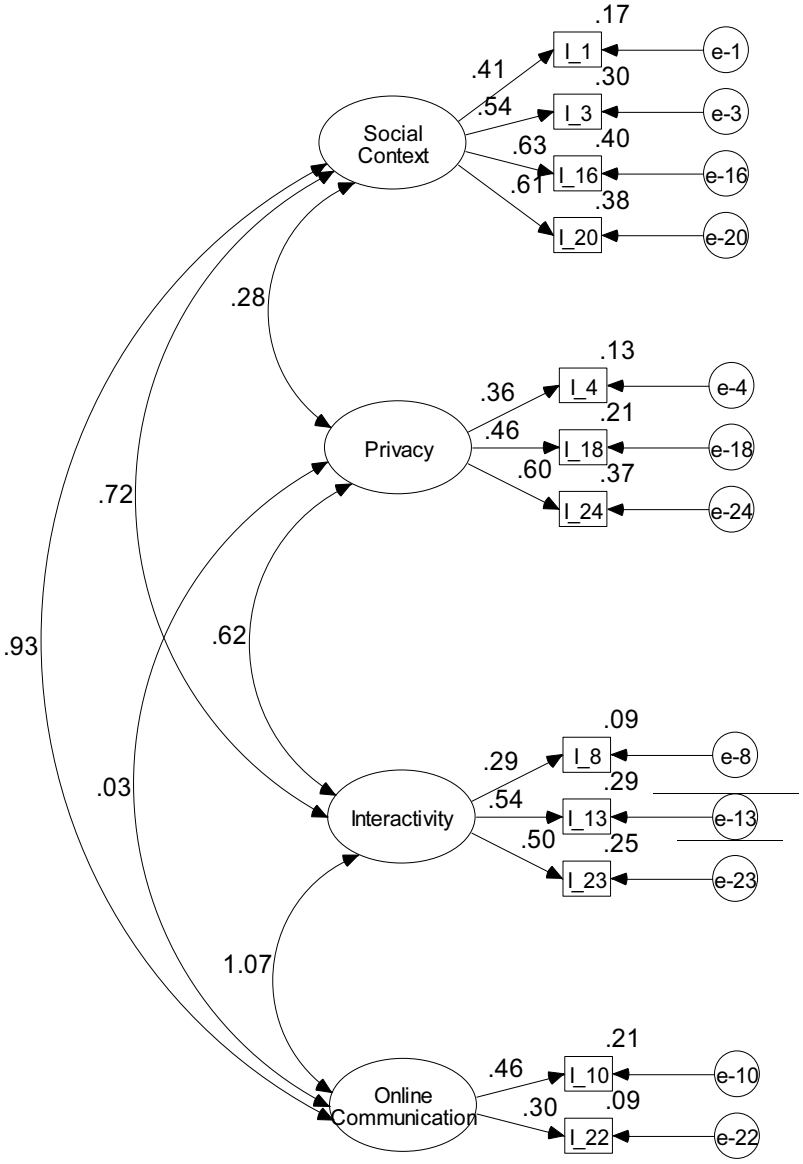

FIGURE 2
Alternative Model 1 With Standardized Factor Pattern Coefficients

RESULTS

Descriptive statistics and correlation coefficients for test items selected for data analysis are presented in Table 2.

Overall Model Fit

The results of various fit indices for the target model and two alternative models are listed in the Table 3.

TABLE 2
Descriptive Statistics and Intercorrelations Among Test Items ($N = 210$)

Item #	*M*	*SD*	*1*	*3*	*16*	*20*	*4*	*18*	*24*	*8*	*13*	*23*	*10*	*22*
1	4.062	.825												
3	3.295	.987	.312											
16	3.043	.994	.189	.304										
20	2.938	.939	.178	.309	.474									
4	2.505	.994	.160	.101	.065	.126								
18	2.514	.887	–.031	–.021	.067	.136	.225							
24	2.767	.987	–.017	.037	.074	.196	.184	.274						
8	3.029	.992	.167	.118	.178	.089	.170	.081	.075					
13	3.248	.991	.192	.194	.188	.212	.179	.159	.240	.100				
23	3.705	.788	.102	.186	.273	.266	.020	.122	.163	.133	.303			
10	3.386	.982	.283	.321	.301	.228	.108	.106	.019	.160	.250	.210		
22	4.086	.865	.241	.138	.040	.036	.022	–.076	–.161	.125	.154	.227	.135	

TABLE 3
Fit Indices for Different CFA Models

Model	χ^2	*df*	χ^2/df	*GFI*	*AGFI*	*NFI*	*CFI*	*RMSEA*	*CAIC*	*ECVI*
Target model	84.407*	50	1.688	.931	.897	.746	.871	.057	262.126	.672
Alternative model 1	73.962*	48	1.541	.941	.904	.778	.903	.051	264.376	.641
Alternative model 2	114.789*	54	2.216	.910	.870	.655	.772	.073	267.119	.779

Note: GFI = goodness-of-fit index; AGFI = adjusted goodness-of-fit index; NFI = normed fit index; CFI = comparative fit index; RMSEA = root mean square error of approximation; CAIC = consistent Akaike information criterion; ECVI = expected cross-validation index.
*$p < .05$.

In those three models, the results of the χ^2 goodness-of-fit test failed to support the model fit. In light of the sample size in the current study ($N = 210$), the above statistically significant results might result from the large sample size (Schumacker & Lomax, 2004). The ratios of χ^2 to degrees of freedom did support an acceptable model fit in the target model (i.e., 1.688), and the alternative Model 1 (i.e., 1.541), but not in the alternative Model 2 (i.e., 2.216).

As to two absolute fit indices (i.e., GFI, and AGFI), and the population-based fit index (i.e., RMSEA) they all lent support to a reasonable fit of three models in the current study. While scrutinizing actual values of indices for those three models, the alternative Model 1 seemed to be the best in terms of the fit to the data, then, the target model, last, the alternative Model 2. However, the differences of model fit indicated by the above three fit indices were not sizable between the target model and alternative Model 1. On the other hand, two incremental fit indices (i.e., NFI, and CFI) were lower than the cutoff (i.e., .900) for an acceptable model fit for all three models with the CFI for the alternative Model 1 as the only exception.

Relative to the other two models, the target model had the lowest value of the CAIC, but

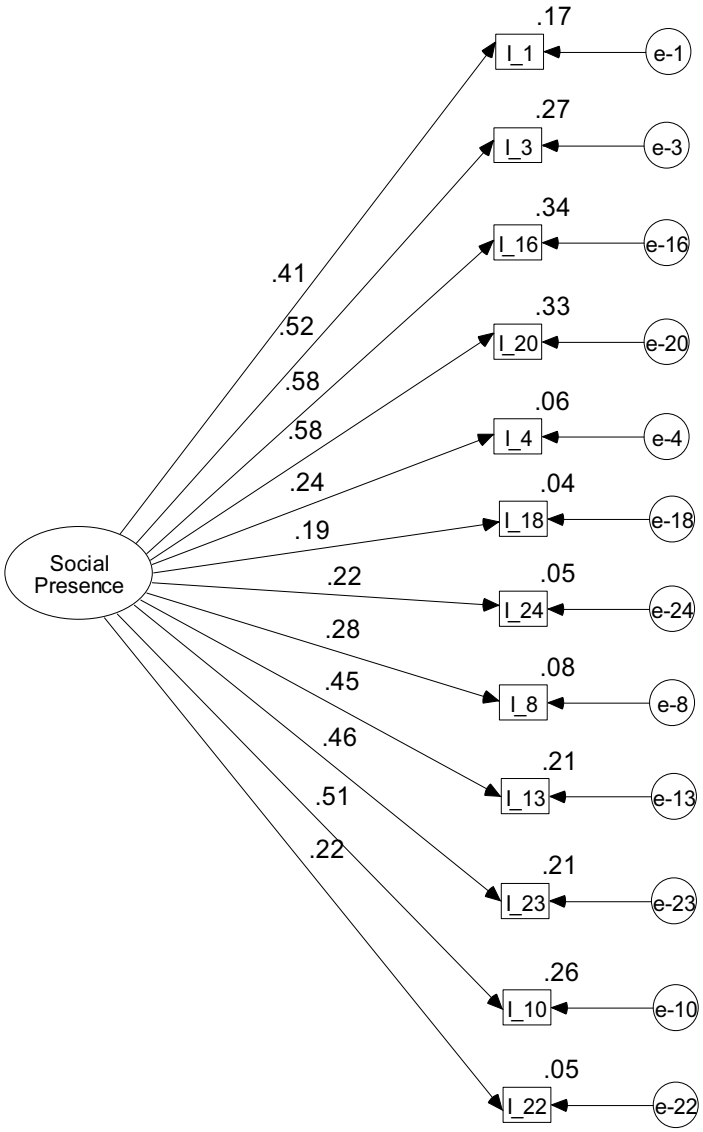

FIGURE 3
Alternative Model 2 With Standardized Factor Pattern Coefficients

the alternative Model 1 had the lowest value of ECVI. The results of two different predictive fit indices were not consistent regarding which model was more likely to have a fit to the future samples from the same target population as good as the fit to the current sample. On the other hand, in light of the results, it could be concluded that the model fit of the alternative Model 2 was least likely to replicate in future samples. Moreover, the differences between the target model and the alternative Model 1 in those two predictive indices were not sizable. Accordingly, the target model and the alternative Model 1 would be perceived as being equal on predictive model fit.

Based on the results of the overall model fit indices, the overall model fit of those three models were supported to some extent, but not

definitely. Among them, the alternative Model 1 appeared to have a better fit to the data. Though, the differences of between the target model and the alternative Model 1 in the overall model fit were not sizable.

Model Parameters

The alternative Model 1 has the best model fit according to the results of various fit indices discussed previously. While examining correlation between various factors (see Figure 2), three factors, social context, interactivity, and online communication were highly correlated and the above results suggested possible redundancies among those factors. Therefore, it may be desirable to consider a more parsimonious two-factor alternative model and test it with a new sample in the future. As to the standardized factor pattern coefficients between those four factors and test items which were equal to the standardized factor structure coefficients (i.e., correlations or loadings) due to the absence of cross-loading (Kline, 2005), two of twelve were lower the cutoff for a poor loading (.32), two higher than the one for a poor loadings, six higher than the one for a fair loading (.45), and two higher than the cutoff for a good loading (.55) (Comrey & Lee, 1992). Those two perceived as poor loadings were for the test items #8 measuring Interactivity, and the test item #22 measuring online communication. Further inspection of those two test items is necessary and revision or removal will be possible options when necessary.

While examining the standardized factor pattern coefficients between test items and various factors, two of twelve were lower than the cutoff for a poor loadings (.32), two higher than the one for a poor loadings, six higher than the one for a fair loading (.45), and two higher than the cutoff for a good loading (.55) (Comrey & Lee, 1992). As in the alternative Model 1, the validity of the test items #8 the test item #22 to measure the designated factors was problematic.

DISCUSSION

Overall Factor Structure

The results of this study supported the factor structure specified in the target model. Therefore, the theoretical framework (Tu & McIsaac, 2002) underlying the development of the CMCQ is empirically supported. In the above theoretical framework, there is one second-order social presence with four aspects as the first-order factors: online communication, social context, interactivity, and privacy. The aforementioned result can serve as evidence for the score validity of the CMCQ. As to the alternative Model 1, it was also supported by the results, and indicated the possibility that those four aspects of online social presence, specified in the theoretical framework (Tu & McIsaac, 2002), and extracted in the previous factor analysis (Tu & Yen 2006), could be four distinct but related factors in the computer-mediated communication without an overarching online social presence. The model fit for the alternative Model 2 was not as good as the other two models and failed to support the unidimensionality of online social presence. Therefore, four different dimensions (factors) will be needed to cover the complexities of participants' perception of being socially connected by computer-mediated communication.

Historically, social presence was conceptualized from a single dimension: the perception of the quality of communication technology. However, researchers (Biocca et al., 2001, 1997; Danchak, Walther, & Swan, 2001) had examined social presence, and perceived it as more complicated than being unidimensional. Danchak et al. suggested a dual-dimension model in which social presence was determined by attributes and immediacy. Biocca et al. empirically studied social presence and concluded that it was a three-dimensional concept consisting of form, behaviors, and sensory.

Based on the results in this study, online social presence appears to be a multidimensional concept, and is conceptualized as the

degree of perception (online communication), feeling (social context), reaction (interactivity), and trustworthiness (privacy) of being connected by CMC to another intellectual entity through electronic media. Online communication represents the users' "perception" of the use, and attributes of online communication technology; it is how well communicators perceive being connected to others via online communication technologies. Social context is constructed from the "feelings" of CMC users toward the CMC environment and another intelligent being. Interactivity concerns the "actions" to which communicators react with others and learning activities. Privacy refers to how "trustworthy" online learners perceive CMC environments to be.

Individual Item Loadings

In the current study, two items—8 and 22—did not load on their designated factors as strongly as theoretically expected. The review and possible revision of those two items are necessary to make them better indicators of the designated factors. Item 8, "Users of CMC normally respond to messages immediately," contributes to the Interactivity factor, while item 22, "My computer keyboard skills allow me to be comfortable while participating in CMC," loaded on online Communication.

The low number of the items (item 10 and item 22) designated to measure online communication may cause some concerns related to model specification (Kline, 2005). It will be advisable to develop new items based on relevant literatures to measure the online communication factor to avoid potential specification issues and get a better measurement of online communication factor. While revising test items, the focus should be given to the perceptions of connectedness by online communication technology. Online communication factor is the users' "perception" on the use and attributes of online communication technology; it is determined by how well communicators perceived connected by communication technology. Connectedness is an emotional experience, evoked by, but independent of, the other's presence or social presence (Rettie, 2003).

IMPLICATIONS

Can online social presence be a two-dimensional concept? In the alternative Model 1, the high correlations between social context, interactivity, and online communication suggested possible redundancies among those factors. It may be necessary to consider, and assess a two-factor alternative model in the future. Can online social presence be a three-dimensional concept? The findings in this study also raised the question regarding whether the presence of privacy factor caused the other three factors to be flattened into one, or whether privacy should be excluded from the theoretical model of online social presence. Future studies should be conducted to examine these issues to evaluate whether privacy is a constituent factor of online social presence. Privacy was an unstable factor in past studies of social presence. Researchers failed to reach the consensus regarding whether privacy was a constituent factor of online social presence. In the current study, privacy in both the Target Model and alternative Model 1 was only moderately correlated to online social presence, and the other three factors. Therefore, further deliberation is in order for the inclusion of privacy as a constituent factor of online social presence.

People's attitude toward privacy can be demonstrated in their risk-taking behaviors. The fluidity of risk-taking behaviors makes the factor of privacy elusive. As a result, the relationship between privacy and online social presence becomes less materialized, and more complicated. Past quantitative data supported the relationship between privacy and online social presence (Tu, 2002b; Tu & McIsaac, 2002). However, qualitative data suggested that different circumstances might lead to the inconsistencies in CMC communicators' responses to the privacy issues. In Tu, and McIsaac's study, it was found that students perceived CMC with a low level of privacy,

but still demonstrated a high level of social presence. The literature suggests that this may be due to the effect of the risk-taking behaviors (Witmer, 1997). Naturally, humans like to take risks. Risk-taking behaviors can be found in online communicators who may perceive CMC as not being private, but still consider it as personal medium with high social presence. Therefore, they may say something that they generally would not say in a face-to-face encounter. The characteristics of the CMC convince them that no one would be interested in their personal and private online communication messages since they are not celebrities. With a more comprehensive understanding of online social presence, perhaps the relation between social presence and privacy will become more lucid.

The instability of the privacy factor may also be explained by generational differences. The meanings, attitude, and values of private versus public vary from generation to generation (Nussbaum, 2007). The differences in beliefs on privacy during online social networking between the younger generation and the older generation became topics in studies (Read, 2006) and a challenge to researchers, practitioners, and administrators (Mitrano, 2006). Are we in public or private in the online environment? Most people would agree that online communications are public. Older generations prefer a higher level of privacy to the extent that they are reluctant to share personal information online. Younger generations are more willing to share personal information online. They perceive the attempt to prevent, or erase personal online traces as futile, and would rather use online communication to promote themselves in a managed way. Unlike older generations, youngsters perceive the Internet use for self-promotion as being more important than the Internet privacy.

Learners from different ethnic groups may also observe, perceive, and interact differently due to the communication morphology culturally determined by their ethnic origins. Further examination of online social presence in different cultural groups is critical to assess whether online social presence remains invariant over those groups. In the past, based on the communication techniques, cultures were classified into: high-context culture (HCC), and low-context culture (LCC) (Mason, 1994). In general, high-context culture is demonstrated by African Americans, Hispanics, American Indians, and Asian Pacific Island Americans, non-White Americans. On the other hand, low-context culture is exemplified by the mainstream U.S. culture of Caucasian, affluent, and native-born White Americans. Due to the influences of their cultures, learners in HCC and LCC groups may interact differently within CMC learning environments and, demonstrate various levels of online social presence, and the resulting perceptions of social context, privacy, interactivity, and online communication.

CONCLUSIONS

A multidimensional model of online social presence with four constituent factors seems to be a plausible theoretical framework to conceptualize how participants perceive their online social interaction. Therefore, the score validity of the CMCQ is empirically supported. However, the review and revision of certain items are necessary to improve the psychometric properties of the CMCQ. More items may need to be developed to better assess the factors in online communication. Despite of an acceptable model structure of social presence validated in this study, social presence remains a complicated, psychological construct. More exhaustive and comprehensive examinations of this theory are required to develop a more thorough understanding of online social presence. Currently, online communications technologies are burgeoning and we are eyewitnesses to history on the frontier of human communication and interaction. We must meet the challenge to visualize, and study the effects of these new technologies on online social presence. When we, as researchers, continue to use traditional paradigms to explain humans' online

perceptions, feelings, reactions, and trust toward to online environments, we should not lose sight of the fact that psychological perceptions, behaviors, and attitudes of humanity will be shaped by the persistent development in online communication technologies.

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