The Impact of Learner Characteristics on the Multi-Dimensional Construct of Social Presence

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ABSTRACT
This study explored the impact of learner characteristics on the multi-dimensional construct of social presence as measured by the computer-mediated communication questionnaire. Using Multiple Analysis of Variance findings reveal that the number of online courses taken and computer-mediated communication experience significantly affect the dimensions of social presence. Findings confirm that significant effects were found to impact three of the four dimensions of social presence, however, no interaction effects for the independent variables were observed. Recommendations for the effective use of online learning recognize that interaction patterns need be structured and pre-course instructional activities be provided so novice learners can acquaint themselves with asynchronous and synchronous online learning environments.

Keywords: online learning, social presence, learner characteristics, computer-mediated communication

INTRODUCTION
Part of the challenge in maintaining quality learning environments, is keeping pace with the plethora of social communication tools characteristic of the medium available that can facilitate social processes and authentic learning experiences (Dunlap & Lowenthal, 2009). To help understand social and interpersonal communication in an online learning environment the multi-dimensional and multi-layered construct of social presence was developed. Social presence has long attracted attention of those involved in computer-mediated communication (CMC) that is typified by collaborative learning environments. One of the primary objectives for online learning has been the creation of an environment where the learner is at ease and experiences comfort in their communications with others (i.e. social presence). This is viewed as desirable because evidence suggests that when learners experience a high degree of social presence they are more likely to engage their cognitive presence in higher order thinking (Garrison, Anderson, & Archer, 2000; Garrison, Cleveland-Innes, & Fung, 2010); actively participate in online communications (Danchak, Walther, & Swan, 2001; Cui, Lockee, & Meng, 2013); are less likely to drop out of their classes (Bowers & Kumar, 2015; Robb & Sutton, 2014); and are more satisfied with their learning experience (Gunawardena & Zittle, 1997; Moallem, 2015; So & Brush, 2008). As a result, social presence has come to be considered the critical affective component and is one of the more important constructs in determining the level of interaction and effectiveness of learning in an online environment (Borup, West, & Graham, 2012; Kim, Kwon, & Cho, 2011; McIssac & Gunawardena, 1996; Lobry de Bruyn, 2004; Mykota & Duncan, 2007; Mykota, 2015; Richardson & Swan, 2003).

However, the persistence and motivation of students taking online courses can also be influenced by learner characteristics that include age and sex (Packham, Jones, Miller, & Thomas, 2004); one's readiness for online learning (Smith, Murphy, & Mahoney, 2003); computer self-efficacy (Compeau & Higgins, 1995; Hayashi, Chen, Ryan, & Wu, 2004); the learner's cognitive characteristics (i.e. learning style and metacognitive skills); and preference or need for social interaction within the learning environment (i.e. group work and class discussion; Miller & Miller, 2000).

As education is a social event it is important to understand the relationship between social presence and learner characteristics. By improving the quality of student experiences and by engaging students as active participants in the learning experience the modernization of flexible and open higher education learning environments can be achieved. Therefore, the purpose of the present study is to determine how learner's computer-mediated communication experience and number of online courses taken interact with the multi-dimensional characteristics of social presence as measured by the computer-mediated communication questionnaire (CMCQ; Tu, 2005).

PEDAGOGY AND SOCIAL PRESENCE
The genesis of social presence theory lies in the conceptualization from social psychology of immediacy (Weiner & Mehrabian, 1968) and intimacy (Argyle & Dean, 1965) surrounding face-to-face communication. In face-to-

face communication, immediacy refers to the psychological distance between two speakers, whereas intimacy is the closeness obtained, verbally and non-verbally, among individuals and maintained by immediacy behaviours (Rettie, 2003). When applied to CMC, Short, Williams, and Christie (1976) defined social presence as the "degree of salience of the other person in the communication and the consequent salience of the interpersonal relationships" (p. 65).

These earlier efforts in the development of social presence theory were specific to business and organizational environments focusing on CMC. Over time thinking changed on how we perceive interpersonal and social communication, which subsequently influenced social presence research. This re-conceptualization of social presence theory from a strictly technologically determined event to one that was co-determined by social and interpersonal interactions was, in part, a result of educational researchers exploring the effects of the construct in online learning.

For example, Gunawardena (1995) in her study on social presence theory concluded that immediacy behaviours enhance and maintain social presence and that those who moderate CMC need to promote a sense of online community so that interaction in collaborative learning environments can occur. By so doing the degree to which an individual in an online learning environment is perceived as a real person is enhanced.

In framing good pedagogical practices for online learning, Garrison et al. (2000) developed the community of inquiry model to recognize the transactional relationship between instructors and learners through the interaction of cognitive presence (of the learner), teaching presence (i.e. the structure and process), and social presence (i.e. affective interpersonal communication). According to Garrison et al. (2000), these elements, which define the community of inquiry model, are fundamental to a successful higher education learning experience. A key component in the model is the concept of social presence, which refers to the extent an individual, is able to present himself or herself emotionally and socially in an online environment as a real person.

With increased attention being focused on social presence theory as applied to online learning various attempts at measuring the construct occurred. As a result, researchers began to test hypothesis on the effects of social presence in online learning environments. With these developments the interpretation of social presence theory and the differences in how it was being defined and operationalized became more apparent.

In assessing social presence through the coding and analyzing of CMC text based transcripts three categories of communicative responses were identified by Rourke, Anderson, Garrison, and Archer (2001) that include affective indicators (i.e. values, beliefs, feelings, and emotions); cohesive indicators (i.e. group presence and commitment); and interactive indicators (i.e. attending in a socially meaningful way). Although Rourke et al. (2001) recognized that the coding and analyzing of CMC text based transcripts using the aforementioned indicators provided a measure of the density of social presence, they also believed future exploratory studies including factor analysis would aid in further defining the construct.

Tu and McIssac (2002) elaborated on the construct by defining social presence as the "degree of feeling, perception, and reaction of being connected via CMC to another intellectual entity"(p.140). Tu (2005) incorporating social learning theory developed and validated (Tu & Yen; 2006; Yen & Tu, 2008) the computer-mediated communication questionnaire (CMCQ). In the initial exploratory factor analysis validation study a four-factor solution comprised of Online Communication, Privacy, Social Context, and Interactivity factors were found to exist (Yen & Tu, 2004; Tu & Yen; 2006). Subsequently, a confirmatory factor analysis using structural equation modeling supported Tu and Yen's (2006) previous findings that social presence was not a unitary construct and that the CMCQ (Tu, 2005) represented a multi-dimensional solution for the construct (Yen & Tu, 2008).

As illustrated by the aforementioned brief review, the understanding of what comprises effective affective communication has become more complex. As a result, social presence and its theoretical underpinnings have come to be understood as a multi-layered and multifaceted phenomenon with definitions tending to fall along a continuum making it difficult to aggregate findings to determine what is working and what is not (Kreijns, Van Acker, Vermeulen, Van Buuren, 2014; Lowenthal, 2010). These definitional ambiguities might seem superfluous, but the interaction between on-task and off-task social interactions within the cognitive, learning, and social/interpersonal dimensions are important to the understanding of how best to structure, develop, and facilitate online learning environments that engage and retain learners (Kreijns, Kirschner, & Vermeulen, 2013).

Subsequent investigations with the CMCQ (Tu, 2005) have added insight into how to interpret the construct while adding to the extant research on the instrument and the effects of social presence on learners. In this

respect, differences in how individuals perceive and experience social presence in online learning environs have been found to exist. For example, differences in the format used (i.e. email, discussion, or chat), proficiency in online learning media environments (Tu & Yen, 2007), and learner characteristics (Mykota & Duncan, 2007) all impact the social presence of learners as measured by the CMCQ. While others report that social presence does not affect preference in choice between online learning and face-to-face group formats (Stein & Wanstreet, 2003) and that gender is not a significant predictor of social presence (Tu et al., 2011).

As previously alluded to four different aspects of social presence were found to occur when using the CMCQ (Tu, 2005) to measure the construct. These dimensions of social presence include Social Context, Privacy, Interactivity, and Online Communication and have been reported on through the conducting of an exploratory factor analysis (Tu & Yen, 2006) and confirmatory factor analysis (Yen & Tu, 2008; 2011).

The Privacy factor relates to the confidentiality of the CMC medium both on a personal and technical level and includes the degree to which learners can express their personal stories and feelings in confidence. The feeling of privacy is associated to the learner's perception psychologically that their communications within an online environmnet are confidential when they are intended to be so, whereas system privavcy is the extent to which the technological aspects of online communication are perceived as secure (Tu & Yen, 2006). The Social Context factor realtes to the ability of CMC users to build trusting and caring social relationships. With trusting relationships the degree of intimacy in the online environment can be enhanced with social relationships being developed. The Interactivity factor relates to one's CMC skill set, which includes the immediacy of responses and comfort with the various communication styles used by others within the online learning environment. For example, informality in communication styles, familiarity with topics posed for discussion, and overall comfort level in discussing topics can all effect interactivity and the subsequent immediacy of the communicative intent (Tu & Yen, 2006). Whereas, the Online Communication factor refers to the ability of CMC users to express themselves through the medium such that the attributes of text based learning environments do not impede one's ability to communicate socially. Online Communication is experienced through the use of asynchronous tools (i.e. email and discussion) and sychronous communication channels (i.e. chat or real time video) that allow learners to colloborate with one another (Stein & Wanstreet, 2003; Yen & Tu, 2008). In this sense, the Online Communication factor of social presence is more related to the attributes of the online learning environment.

In assessing the underlying factors which comprise social presence as represented in the CMCQ (Tu, 2005), perception differences were found to exist such that the cultural backgrounds of learners influenced the Social Context, Privacy, and Interactivity domains while Online Communication was viewed as the least relevant component (Yen & Tu, 2011). As to why, possible contextual factors that include the cultural mindset of the learners and their communication patterns could have impacted perceptions of the different aspects of social presence reported (Yen & Tu, 2011).

However, except for the aforementioned study there is a dearth of research on the multi-dimensional nature of social presence as measured by the CMCQ (Tu, 2005) and the impact on learner characteristics. To address this gap, the present study seeks to ascertain if learners' self rated experience with computer-mediated communication and the number of online courses taken act independently or interact together thereby resulting in a significant effect on the dimensions of social presence that include Social Context, Privacy, Interactivity and Online Communication as measured by the CMCQ (Tu, 2005).

METHODS

The participant sample was derived from students enrolled in a graduate program offered at the University of Saskatchewan. The graduate program is comprised of nine online courses that are delivered over two years. Using convenience sampling, 273 students (90% response rate) enrolled in the program participated in the study by voluntarily completing the survey package that included a demographic and social presence questionnaire (CMCQ; Tu, 2005). The sentence stems on the CMCQ (Tu, 2005) were used to identify social presence in a text-based system with the CMC tools email, discussion, and chat. The respondent was asked to complete the instrument on the basis of a five-point Likert scale converted to a numerical weighting ranging in options from 0 (uncertain); 1 (strongly disagree); 2 (disagree); 3 (agree); and 4 (strongly agree). Previous findings of the score validity and score reliability (Yen & Tu, 2004) of the CMCQ confirmed a 12 item four-factor structure. This was further supported by a confirmatory factor analysis (Yen & Tu, 2008) and multi-group confirmatory factor analysis that determined the instrument was measuring the same construct across varying groups (Yen & Tu, 2011). In all cases (Yen & Tu, 2004; Yen & Tu, 2008; Yen & Tu, 2011) the 12 item four-factor structure had moderately high factor loadings (i.e. >.32), which was deemed acceptable for retention (Comrey & Lee, 1992). Based on the previously reported findings it was deemed appropriate that the four-factor structure of social

presence, which includes the Privacy, Interactivity, Social Context, and Online Communication dimensions, was appropriate for inclusion in the present study.

The frequency counts for the demographic variables sex, number of online courses taken, and self-rated computer-mediated communication experience are reported in Table 1. When examining the frequency counts, it was found that although sex was initially a variable considered having a potential impact it was excluded from further analysis because of the low number of males in the sample. For purposes of the present study, analysis was conducted using a 2 X 4 MANOVA with Number of Online Courses and Computer-Mediated Communication Experience as the fixed factors and total scores for the Privacy, Interactivity, Social Context, and Online Communication domains as the dependent variables. Accordingly, the study sought to explore what were the main effects of the fixed factors Number of Online Courses and Computer Mediated Communication Experience (i.e. the independent variables) on the dependent variables (i.e. Privacy, Interactivity, Social Context and Online Communication domains) and what were the interactions, if any, among the independent variables.

Table 1. Frequency Demographics, N=273

	Frequency	Percent
Sex		
Male	20	7.3
Female	253	92.7
CMC Experience		
Novice to Average	169	61.9
Intermediate to Expert	104	38.1
Number of Online Courses		
1 course	109	39.9
2-3 courses	78	28.6
4 or more courses	86	31.5

RESULTS

Data was analyzed using SPSS Statistics Version 24. In conducting the analysis it was found that the MANOVA statistical assumptions were met. Box's Test of Equality of Covariance Matrices was not significant (.848; p<.05) for the dependent variables indicating there was not a significant variation in the covariance matrices and there was not a violation of homoscedasticity. The test of group differences (i.e. Pillai's Trace) was robust with the sample sizes equal between groups (Field, 2013). Levene's Test of Equality of Error Variances (i.e. p<.05) was not significant on all four of the subscale scores for the Social Context (.549), Privacy (.972), Interactivity (.065), and Online Communication (.12) factors of the CMCQ. However, it should also be noted that the sample is skewed towards gender (i.e. females) and that although research on the construct social presence with the CMCQ has found that gender differences do not appear to exist (Tu et al., 2011) the results need be interpreted within this limitation.

The results of the 2 X 4 MANOVA with CMC Experience and Number of Online Courses as the fixed factors (independent variables) and the four dependent variables Social Context, Privacy, Interactivity, and Online Communication are presented in Table 2. With the large group sizes and the observed power being >.7, it was deemed acceptable to set alpha at .1 for tests of significance (Stevens, 2012). For the multivariate analysis two significant effects occurred. Number of Online Courses had a significant effect on the dependent variables V = .064, $F(8, 530) = 2.2$, p = .026 and CMC Experience also had a significant effect on the dependent variables V = .032, F (4, 264) = 2.2, p = .068. In spite of this, there was not a statistically significant interaction effect between Number of Online Courses and CMC Experience on the combined dependent variables V = .037, F (8, 530) = 1.24, p = .270.

Table 2. Multivariate Analysis for Four Dependent Variables

Source	*df*(num./denom.)	F ratio	Eta^2	Power
No. of Online Courses	8,530	2.204*	.032	.922
CMC Experience	4,264	2.211*	.032	.757
No. of Online Courses x CMC Experience	8,530	1.238	.019	.702

*p<.1

The univariate ANOVA results indicated that with Number of Online Courses as the independent variable the dependent variables Social Context $F(2, 267) = 4.16$, $p = .017$ and Online Communication $F(2, 267) = 5.33$, $p = .005$ were significant, while the dependent variables Interactivity $F(2, 267) = .849$, $p = .429$ and Privacy $F(2, 267) = 1.16$, $p = .315$ were not. Correspondingly, the univariate ANOVA results indicated that with CMC Experience as the independent variable, the dependent variables Online Communication $F(2, 267) = 2.32$, $p = .011$ and Interactivity $F(2, 267) = 4.81$, $p = .029$ were significant while the dependent variables Social Context $F(2, 267) = 3.73$, $p = .236$ and Privacy $F(2, 267) = .081$, $p = .776$, were not. Additionally, there were no significant univariate effects for the dependent variables on the multivariate interaction.

The univariate analysis of variance results are reported in Table 3. The observed means and standard deviations for Number of Online Courses and the dependent variables are displayed in Table 4. The observed means and standard deviations for CMC Experience and the dependent variables are displayed in Table 5. In all instances the means for the dependent variables are higher as function of greater CMC Experience. Furthermore, in most cases the means for the dependent variables increased as a function of number of classes taken with the exception of the Interactivity domain in which the means for 4 or more courses and 2 -3 courses were close to equivalency while the mean for 1 course was lower than both.

Table 3. Univariate Analysis of Variance: F Ratios for Four Dependent Variables

Measure	No. of Online Courses	CMC Experience	No. of Online Courses x CMC Experience
	MS (2,267)	MS (1,267)	MS (2,267)
Social Context	4.16*	.797	1.453
Privacy	1.16	.081	1.618
Online Communication	5.331*	6.503*	1.257
Interactivity	.849	4.812*	.261

*p<.1

Table 4. Observed Means and Standard Deviations for Number of Online Courses

Variables	No. of Online Courses					
	1 Course n=112		2-3 Courses n=78		4 or More Courses n=86	
	M	*SD*	*M*	*SD*	*M*	*SD*
Social Context	8.107	2.455	8.897	2.921	9.035	2.834
Interactivity	7.369	2.022	7.743	2.165	7.698	1.715
Online Communication	5.116	1.493	5.705	1.301	5.558	1.212
Privacy	4.541	2.713	5.103	2.771	4.569	2.716

*p<.1

Table 5. Observed Means and Standard Deviations for CMC Experience

Variables	Novice to Average n=171		Intermediate to Expert n=105	
	M	*SD*	*M*	*SD*
Social Context	8.526	2.684	8.771	2.826
Interactivity	7.365	2.097	7.924	1.714
Online Communication	5.2647	1.438	5.669	1.270
Privacy	4.659	2.773	4.791	2.677

*p<.1

DISCUSSION

The present study explored how the number of online courses taken and computer-mediated communication experience impacted the dimensions of social presence as measured by the CMCQ (Tu, 2005) and what if any interaction effects occurred between the independent variables (Number of Online Courses and CMC Experience) on the dependent variables Social Context, Privacy, Interactivity, and Online Communication (i.e. the dimensions of social presence). As would be expected, the mean scores for the dimensions of social presence increase as a function of number of online courses taken and the degree of computer-mediated communication experience an individual has. Although no interaction effects were found between the independent variables, significant effects were found for the independent variables on the dependent variables.

Logically, it would be expected that learner's with greater CMC experience would be more comfortable online and therefore more likely to engage in their learning environment as there is a familiarity with the medium and the technological determination of events. In the present study, it was found that these effects were most pronounced for the Interactivity and Online Communication domains.

The Interactivity factor relates to one's aptitude toward the computer-mediated medium which impacts the immediacy of responses. For example, this includes the ablity to accommodate differing communication styles while not being inhibited by unfamiliar discussion topics. Findings indicate that learner interactivity is greatest among those who have a high degree of CMC experience. Interactivity, however, was not found to have had a significant effect as based on Number of Online Courses taken. Although, those who had only enrolled in one course experienced less Interactivity, a significant effect was not found for the independent variable Number of Online Courses. What this implies then is that gains in CMC experience as it pertains to the Interactivity domain are not dependent in of themselves on the online learning environment rather they are developed within the various social interaction tools (i.e. email, blogs, discussion forums, facebook and twitter) that are available through computer-mediated communication and more broadly the Internet. In this respect, novice online students with limited computer-mediated communication experience need to be made aware of how interaction is structured for online learning. Therefore, instructors need to construct interaction patterns to overcome the inherent challenges of the medium.

Findings also reveal that the Online Communication dimension of social presence was higher for those whom had more CMC Experience and lowest among those who had only taken one course. Online Communication is viewed as a technical proficiency attributable to the learner that is learnt both as a function of CMC Experience and Number of Online Courses Taken. Ease of communication is a skill set, which can be acquired through the Internet or other computer-mediated environs, then applied, and further developed in both synchronous and asynchronous learning environments. Accordingly, if educators desire learners to be highly collaborative in their professional practice, it is important that students are provided pre-course instructional activities necessary to embrace computer-mediated communication so as to ensure best practices in their course work.

The Social Context domain was significantly impacted by the amount of course work undertaken but not by the degree of CMC experience a learner had acquired. Social Context refers to affective communication that develops over time and includes the feeling, emotion, and growth of trusting relationships one can experience in an online environment. It would appear then that Social Context is intrinsic to an online learning environment as it is fostered by the interactions that occur between online learners and instructors within a course. The informality and friendliness modeled by the instructor coupled with frequent interaction can sustain this process (Tu, 2002).

The Social Context and Interactivity dimensions of social presence are also cultivated by instructors through their contribution to discussions, replying promptly to email, addressing students by their first names, and becoming acquainted with the posted biographies of students (Aragon, 2003). Informality in communication styles, familiarity with topics posed for discussion, and the overall comfort level in discussing topics can all effect the subsequent immediacy of the communicative intent (Tu & Yen, 2006).

Social presence, more generally speaking, can be developed through instructional design strategies that include limiting enrolment (i.e. to a 30:1 ratio; Rovai, 2001) development of collaborative course assignments (Aragon, 2003; Mykota, 2013, So & Brush, 2008; Yen & Tu, 2011) and enhanced media integration (Kim et al., 2011). What this implies is that development and support for faculty in delivery of online courses is needed. Therefore, by undertaking the aforementioned recommendations instructors, students, and course designers can overcome some of the inherent barriers to the creation of social presence.

LIMITATIONS

The study is limited through the use of convenience sampling and the homogeneity of the sample as it relates to gender. In this respect, the interpretation and generalization of this study needs be understood within these limitations.

CONCLUSION

This study contributes to the knowledge and research on social presence through the applied measurement of the construct and its dimensions. Future research should continue to explore the construct social presence and its ensuing dimensions, as measured by the CMCQ (Tu, 2005), with varying samples and contexts. Additionally, qualitative phenomenological or grounded theory studies could be conducted to delve in-depth into the meaning of affective communication and its effect on the learner's cognitive presence. In turn, a clearer conceptualization of what represents the dimensionality of social presence will enable researchers to test hypothesis and conduct comparative analysis of the construct. By focusing on the empirical validation of the dimensional framework evidenced based research practices in online learning environments can continue to be advanced.

REFERENCES

Aragon, S. (2003). Creating social presence in online environments. *New Directions for Adult and Continuing Education, 100*, 57-68.

Argyle, M., & Dean, J. (1965). Eye contact, distance and affiliation. *Sociometry, 28*, 289-304.

Borup, J., West, R. E., & Graham, C. R. (2012). Improving online social presence through asynchronous video. *The Internet and Higher Education, 15*(3), 195-203.

Bowers, J., & Kumar, P. (2015). Students' perceptions of teaching and social presence: A comparative analysis of face-to-face and online learning environments. *International Journal of Web-Based Learning and Teaching Technologies, 10*(1), 27-44.

Compeau, D. R., & Higgins, C. A. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly, 19*, 189-211.

Comrey, A. L., & Lee, H. B. (1992). *A first course in factor analysis.* Hillsdale, NJ: Erlbaum.

Cui, G., Lockee, B., & Meng, C. (2013). Building modern online social presence: A review of social presence theory and its instructional design implications for future trends. *Education and Information Technologies, 18*(4), 661-685.

Danchak, M. M, Walther, J. B., & Swan, K. P. (2001). *Presence in mediated instruction: Bandwidth, behaviour, and expectancy violations.* A paper presented to the annual meeting on Asynchronous Learning Networks, Orlando, FL.

Dunlap, J. C., & Lowenthal, P. R. (2009). Tweeting the night away: Using Twitter to enhance social presence. *Journal of Information Systems Education, 20*(2), 129-135.

Field, A. (2013). *Discovering statistics using IBM SPSS statistics*. Sage.

Garrison, D. R., Anderson, T., Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education, 2(*2-3), 87-105.

Garrison, D. R., Cleveland-Innes, M., & Fung, T. S. (2010). Exploring causal relationships among teaching, cognitive and social presence: Student perceptions of the community of inquiry framework. *The Internet and Higher Education, 13*(1), 31-36.

Gunawardena, C. N. & Zittle, F. J. (1997). Social presence as a predictor of satisfaction within a computer-mediated conferencing environment. *The American Journal of Distance Education, 11*(3), 8-26.

Gunawardena, C. N. (1995). Social presence theory and implications for interaction and collaborative learning in computer conferences. *International Journal of Educational Telecommunications, 1*(2/3), 147-166.

Hayashi, A., Chen, C., Ryan, T., & Wu, J. (2004). The role of social presence and moderating role of computer self-efficacy in predicting the continuance usage of e-learning systems. *Journal of Information Systems Education, 15*(2), 139-154.

Kim, J., Kwon, Y., & Cho, D. (2011). Investigating factors that influence social presence and learning outcomes in distance higher education. *Computers and Education, 57*, 1512-1520.

Kreijns, K., Kirschner, P. A., & Vermeulen, M. (2013). Social aspects of CSCL: A research framework. *Educational Psychologist, 48*(4), 229-242.

Kreijns, K., Van Acker, F., Vermeulen, M., & Van Buuren, H. (2014). Community of Inquiry: Social presence revisited. *E-Learning and Digital Media, 11*(1), 5-18.

Lobry de Bruyn, L. (2004). Monitoring online communication: Can the development of convergence and social presence indicate an interactive learning environment? *Distance Education, 25*(1), 67-81.

Lowenthal, P. R. (2010). The evolution and influence of social presence theory on online learning, In Kidd, T. (Ed.), *Online education and adult learning: New frontiers for teaching practices* (pp. 124-139), Hershey, PA: IGI Global.

McIsaac, M. S., & Gunawardena, C. N. (1996). Distant education. In D. Jonassen (Ed.), *Handbook for*

research on educational communications and technology (pp .403-437). NY: Scholastic Press.
Miller, S. M. & Miller, K. L. (2000). Theoretical and practical considerations in the design of web-based instruction. In B. Abbey (Ed.), *Instructional and cognitive impacts of web-based education* (pp. 156-177). Hershey, PA: Idea Group Publishing.
Moallem, M. (2015). The impact of synchronous and asynchronous communication tools on learner self-regulation, social presence, immediacy, intimacy and satisfaction in collaborative online learning. *The Online Journal of Distance Education and e-Learning, 3*(3), 55.
Mykota, D. B., & Duncan, R. (2007). Learner characteristics as predictors of online social presence. *Canadian Journal of Education, 30*(1), 157-170.
Mykota, D., (2013). A coordinated decentralized approach to online project development. *Turkish Online Journal of Educational Technology, 12*(3), 1-14.
Mykota, D. B., (2015). The influence of learner characteristics on social presence. *Procedia-Social and Behavioral Sciences, 176*, 627-632.
Packham, G., Jones, P., Miller, C., & Thomas, B. (2004). E-learning and retention: Key factors influencing student withdrawal. *Education and Training, 46*(6/7), 335-342.
Richardson, J. C., & Swan, K. (2003). Examining social presence in online courses in relation to students' perceived learning and satisfaction. *Journal of Asynchronous Learning Networks, 7*(1), 68-88.
Rettie, R. (2003). *Connectedness, awareness and social presence*. Paper presented at the 6th International Presence Workshop, Aalborg University, Aalborg, Denmark
Robb, C. A., & Sutton, J. (2014). The importance of social presence and motivation in distance learning. *Journal of Technology, Management and Applied Engineering, 31*(1-3), 1-10.
Rourke, L., Anderson, T., Garrison, R. D., & Archer, W. (2001). Assessing social presence in asynchronous text-based computer conferencing. *Journal of Distance Education, 4*(21), 50-71.
Rovai, A. P. (2001). Building and sustaining community in asynchronous learning networks. *Internet and Higher Education, 3(2000),* 285-297.
Short, J., Williams, E., & Christie, B. (1976). *The social psychology of telecommunications.* London: John Wiley & Sons.
Smith, P. J., Murphy, K. L., & Mahoney, S. E. (2003). Towards identifying factors underlying readiness for online learning: An exploratory study. *Distance Education, 24*(1), 57-67.
So, H-J. & Brush, T. A. (2008). Student perceptions of collaborative learning, social presence and satisfaction in a blended learning environment: Relationships and critical factors. *Computers & Education, 51,* 318-336.
Stein, D. S., & Wanstreet, C. E. (2003). *Role of social presence, choice of online or face to-face group format, and satisfaction with perceived knowledge gained in a distance learning environment.* Midwest Research-to-Practice Conference in Adult, Continuing, and Community Education.
Stevens, J. P. (2012). *Applied multivariate statistics for the social sciences.* Routledge.
Tu, C. H. (2002). The measurement of social presence in an online learning environment. *International Journal on E-Learning, 1*(2), 34-45.
Tu, C. H. (2005). *Computer-mediated communication questionnaire*. Flagstaff, AZ: Author.
Tu, C. H., & McIssac, M. S. (2002). An examination of social presence to increase interaction in online classes. *American Journal of Distance Education, 16*(2), 131-150.
Tu, C. H., & Yen, C. J. (2006). A study of multidimensional online social presence. In L. W. Cooke (Ed.), *Frontiers in higher education* (pp.77-104). Hauppauge, NY: Nova Science.
Tu, C. H., & Yen, C. J. (2007). *A study of the relationship between computer-mediated communication proficiency and online social presence*. Presented at the annual conference of AERA, Chicago, IL.
Tu, C. H., Yen, C. J., & Blocher, M. (2011). A study of the relationship between gender and online social presence. *International Journal of Online Pedagogy and Course Design, 1*(3), 33-49.
Yen, C. H., & Tu, C. H. (2004). *Revisit the measurement of online social presence*. In meeting of the Annual Conference of the American Educational Research Association, San Diego, CA.
Yen, C. J., & Tu, C. H. (2008). Online social presence: A study of the score validity of the computer mediated questionnaire. *Quarterly Review of Distance Education, 9*(3), 297
Yen, C. J., & Tu, C. H. (2011). A multiple group confirmatory factor analysis of the scores for online social presence: Do they measure the same thing across cultural groups? *Journal of Educational Computing Research, 44*(2) 219-242,
Wiener, M., & Mehrabian, A. (1968). *Language within language: Immediacy, a channel in verbal communication.* New York, NY. Appleton-Century-Crofts.