The Role of Perceived Learning and Communities of Inquiry in Predicting International Students' Course Grades in Computer-Mediated Graduate Courses

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This study examined the predictive relationship among international students' sense of community, perceived learning, and end-of-course grades in computer-mediated, U.S. graduate-level courses. The community of inquiry (CoI) framework served as the theoretical foundation for the study. Step-wise hierarchical multiple regression showed no statistically significant relationship between the constructs of CoI (social presence, teaching presence, and cognitive presence), perceived learning, and end of course grades. These findings are contrary to previous research findings and initial development of a predictive model utilizing CoI and perceived learning in a non-international population, thus demonstrating that international students may not experience instruction and the instructional environment in the same way as non-international students. Findings hold important implications for the design and delivery of graduate level courses for the international student population and support the need to examine other predictive factors of international student achievement.

Keywords: *community of inquiry, international students, perceived learning, course grades, computer-mediated*

With advances in access to technology and the ever-increasing globalization of education, the number of international students enrolling in U.S. universities is continuously rising (Aneja, 2010; Bista & Foster, 2011; Gautam, Lowery, Mays, & Durant, 2016; Lin, 2012; Sadykova & Dautermann, 2009). However, despite the increase in international student enrollment, many U.S. universities have been slow to examine practices that support these students by addressing the heightened challenges that they encounter, and, importantly, to provide accommodations that support their success (Amirali, & Bakken, 2015; Lin, 2012; Sadykova & Dautermann, 2009). This has contributed to what some consider a "persistent international divide" (Sadykova & Dautermann, 2009, p. 90).

Research findings indicate that international students encounter greater difficulty than their American peers, with study participants citing challenges such as language difficulties, communication barriers, emotional stress, lack of resources, a diminished support network, and culture shock as playing a significant role (Amirali & Bakken, 2015; Gautam et al., 2016; Lin, 2012). It is documented that international students may feel a sense of disconnect, loss, or increased anxiety due to differing experiences and perceptions (Lin, 2012). These disparities often extend to instructors and peers as well. As cultural differences can influence students' perceptions, these differences in turn can affect students' academic performance (Lin, 2012). Therefore, examining international students' perceptions of community and perceptions of learning could contribute to and inform current practices by enhancing students' experiences in the classroom and ensuring appropriate support in course design and delivery.

Unfortunately, little research exists that examines the perceptions of international students enrolled in U.S. courses, in spite of evidence that perceptions differ from culture to culture (Gautam et al., 2016) and that perceptions influence performance (Lin, 2012).

Differences in perceptions can result in cultural misunderstandings, leading to heightened barriers that international students must overcome in order to achieve success in the higher education setting. Heightened barriers are often facilitated by educational institutions themselves, as many educational institutions continue to adopt a residential mindset in designing and offering instructional opportunities despite an increase in computer-mediated, hybrid, and online course offerings (Sadykova & Dautermann, 2009; Zhang & Kenny, 2010). Critical to shifting this mindset is understanding the experiences of international students and their perceptions, as well as how these experiences and perceptions influence their level of success, thus challenging the "currently prevailing…belief that higher quantity of interaction supports student satisfaction and student learning" (Sadykova & Dautermann, 2009, p. 105) and moving towards quality and enhanced perceptions.

Given the globalization of society and the belief that international education offers "richer life experiences" (Lin, 2012, p. 333), it is necessary to examine how best to meet the needs of international students in order to facilitate quality learning and communication, thus enhancing the internationalization of education (Amirali & Bakken, 2015; Aneja, 2010). Research findings support the premise that international education is an "important vehicle for individuals, schools, and countries to be competitive in the global marketplace" (Lin, 2012, p. 334). Thus, a documented need exists to study U.S. learning environments and international student experiences (Amirali & Bakken, 2015; Wang, 2009) and, subsequently, to match instructional design of courses with the unique needs of international students (Wang & Reeves, 2007).

Problem Statement

As communication has been cited as one of the largest barriers for international students (Amirali & Bakken, 2015; Lin, 2012; Wang & Reeves, 2007), and as sense of community has been purported as critical to international students' success in the synchronous online environment (Wang & Reeves, 2007), the current study examines the important topic of international student experiences, drawing on the community of inquiry (CoI) framework as a measure of sense of community. Specifically, the study was designed with the purpose of validating previous research findings regarding the predictive nature of sense of community and perceived learning in relation to students' end-of-course grades (Rockinson-Szapkiw, Wendt, Wighting, & Nisbet, 2016), while adding a focus on international students.

Theoretical Framework

In the following sections, the theoretical frameworks on which this study is based will be described, including sense of community and the communities of inquiry framework.

Sense of community.

Sense of community served as the foundational framework of this study. Sense of community is defined as "a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members' needs will be met through their commitment to be together" (McMillan & Chavis, 1986, p. 9). It is fostered through (a) the building of a community of learners, and (b) the development of shared goals and shared meaning through collaborative practice (Rovai, 2002). Research findings have consistently demonstrated that sense of community is a contributing factor to positive student learning outcomes (e.g., Akyol & Garrison, 2011; Arbaugh, et al., 2008; Nisbet, Wighting, &

Rockinson-Szapkiw, 2013; Rovai, 2002) and, as such, sense of community has been recognized as essential to overall success in higher education (Shea, Li, & Pickett, 2006).

The importance of sense of community for international students is further supported by Wang and Reeves (2007), who, when examining the experiences of international students in face-to-face courses as compared to online synchronous courses, concluded that international students require increased interactions (i.e. student-student and student-instructor conversations, learning opportunities, and feedback) in order to establish community. Study participants cited language and communication barriers as substantial difficulties, with lack of interaction and lack of timeliness in instructor responses to students being identified as the biggest challenges. Participants also reported preferring the face-to-face environment over the synchronous online environment and, as a result, the authors concluded that the synchronous environment could not serve as an equivalent substitute for the face-to-face classroom with international students. Community, therefore, is an important aspect of the face-to-face and computer-mediated learning environments in fostering positive student outcomes.

Communities of inquiry.

The community of inquiry (CoI) framework (Arbaugh et. al, 2008) has been the most frequently utilized model for explaining sense of community within a computer-mediated learning environment (Kupczynski, Ice, Wiesenmayer, & McCluskey, 2010). Based on the premise that community is the key component to effective learning, the model is composed of three interacting constructs: teaching presence, social presence, and cognitive presence (Swan, Garrison, & Richardson, 2009). Teaching presence is defined as "the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educational[ly] worthwhile learning outcomes" (Garrison, Cleveland-Innes, & Vaughan,

2015, para.1). Social presence is defined as "the degree to which participants…feel affectively connected to one another" (Swan et al., 2009, p. 9), that is, participants' sense of belonging in a social learning community. Cognitive presence is defined as "the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse" (Swan et al., 2009, p. 8). The development and fostering of each of the constructs of the CoI framework (teaching presence, social presence, and cognitive presence) has been found to lead to positive student outcomes and development of a sense of community (Akyol & Garrison, 2011; Swan et al., 2009). However, the CoI framework has not been fully examined with international populations and, to date, has not been used as a predictor of international student success in U.S. courses. As such, the focus of this study was to determine whether the CoI framework can be used to predict international student success in US graduate-level courses, thus furthering understanding of factors that facilitate international student success and filling an existing gap in the literature.

Perceived Learning

Student learning is considered a primary desired outcome of most educational endeavors, and in university settings, course grades are typically viewed as reflective of student success in classes. In fact, numerous studies have demonstrated a linkage between grade point average and cognitive growth in students (e.g., Astin 1985, 1993; Pascarella & Terenzini 2005). The use of course grades as a sole measure of academic attainment, however, is not without its challenges. As noted by Rovai (2002), limiting factors include aspects such as (a) restricted range, with many students in higher education programs receiving relatively high grades; (b) inconsistencies from one instructor to another or from one semester to another; (c) inability to account for varying degrees of student knowledge of a subject prior to entering a given course; and (d) the

fact that grades are often at least partially reflective of some factors other than "cognitive learning" (for example, class participation, timeliness of submissions, and attendance). Thus, researchers have attempted to identify other measures to quantify student success. One such measure that has been utilized by researchers over the past two decades is perceived learning.

Student perceptions of the degree of their learning in a given course have both practical and theoretical significance. From a practical standpoint, student perceptions of how much they have benefited from a course likely hold value to both instructors and learners. In addition, research findings have consistently demonstrated that self-reports of cognitive learning on the part of students are comparable to results achieved by more direct measures (Corallo, 1994; Pace, 1990). Pace (1990) presented evidence that self-reports are valid measures of learning due to their consistency over time and across various student populations.

In 2009, Rovai, Wighting, Baker, and Grooms created an instrument that measures perceived learning through self-reporting measures. This instrument, the Cognitive Affective and Psychomotor (CAP) Perceived Learning Scale, identifies three distinct components of perceived learning: cognitive, affective, and psychomotor. To describe cognitive learning, the authors utilized Bloom's (1956) definition: "recall or recognition of knowledge and the development of intellectual abilities and skills" (p. 7). Affective learning was defined as "an increasing internalization of positive attitudes toward the content or subject matter;" and psychomotor learning was described as learning "associated with physical skills" (p. 8). The CAP Perceived Learning Scale has been utilized in a number of studies with university students, and findings have demonstrated a significant relationship between perceived learning and academic outcomes, as well as perceived learning and sense of community in university teaching environments (Nisbet et al, 2013; Wighting, 2011; Wighting, Nisbet, & Spaulding, 2010).

Purpose

The purpose of this study was to examine the predictive relationship among (a) sense of community, using the community of inquiry (CoI) framework; (b) perceived learning; and (c) graduate students' course grades among an international population enrolled in computer-mediated U.S. university courses. This study further explored the initial predictive relationship established by Rockinson-Szapkiw et al. (2016) by extending the examination from the traditional face-to-face and fully online contexts to the computer-mediated context, while also exploring the applicability to an international student population. Thus, it was hypothesized that a positive relationship exists between overall CoI and end-of-course grades, the individual constructs of CoI (teaching presence, social presence, and cognitive presence) and end-of-course grades, and students' perceived learning and end-of-course grades.

Methodology

This study followed a predictive correlational design. Step-wise hierarchical multiple regression was used to examine the predictive relationship among students' sense of community, perceived learning, and course grades. The research question was: Is there a statistically significant relationship between CoI, perceived learning, and end-of-course grades among international students enrolled in computer-mediated graduate-level courses in the U.S.?

Participants

A volunteer sample of 262 students enrolled in graduate computer-mediated courses in the School of Computer Information Systems at an international university located in northern Virginia served as the research sample for this study. After the researchers received approval from the Institutional Review Board, students enrolled in the following courses were provided the invitation to participate in the study during the fifth week of their course during the Summer

2015 semester: CMP 511 Computer Architecture & Implementation, CMP 550 IT Infrastructure, CMP 553 Analysis, Modeling, & Design, CMP 560 Software Engineering, CMP 612 IT Project Management, CMP 641 Operating Systems, and CMP 663 Web Applications Development. A total of 427 students were invited to participate and 61% volunteered to do so. The response rate, however, does not account for students who were enrolled in multiple courses included in the study and, thus, was actually higher than the reported 61%. It should be noted that students who were enrolled in multiple courses were only allowed to complete the survey once; they were not allowed to participate in the study in the context of multiple courses. The sample consisted of 202 males and 60 females. The average age of the participants was 24.43 years, with a range of 20 to 42. The average number of semesters completed at the university, including the current semester, was 1.77, with a range from 1 semester to 8 semesters. Students were not provided an incentive to participate other than informing the practices of the university and potentially improving future course design and delivery. Additional demographics are presented in Table 1.

Students who participated in the study were required to be 18 years of age or older and enrolled in one of the selected courses at the university. Each of the courses in which students were enrolled were eight weeks in length, were conducted in the residential setting, and incorporated the use of computer-mediated components including the use of the Moodle™ learning management system. Moodle™ was used to provide access to course lectures, course notes, supplementary learning materials, and discussion forums as well as for submission of course assignments.

Table 1

Participant Demographics

Ethnicity	Asian = 99.6% Caucasian = .4%
Native Country	Bangladesh = 1.1% Cambodia = .4% India = 95.4% Mongolia = .4% Nepal = .8% Syria = .4% Vietnam = .4% Not reported = 1.1%
Native Language	Arabic & Turkish = .4% Bangla = .4% Bengali = .8% English = 7.6% Gujrati = .4% Hindi = 5.3% Hindi & Telugu = 2.3% Kannada = .4% Khmer = .4% Marathi = .4% Nepali = .8% Tamil = .8% Telugu = 75.2% Thai = 3.2% Urdu = .4% Vietnamese = .4% Not reported = 3.8%

Procedures

Students in each course were invited to complete the survey during the fifth week of the Summer 2015 semester. The survey was administered in an online format; a unique link was provided to students in-class that linked to the survey hosted by Google Forms™. Upon visiting the link, students were able to read an informed consent and a brief explanation of the study prior to beginning the survey. The survey consisted of questions related to the course in which students were enrolled and demographic questions. Following Rockinson-Szapkiw et al.'s (2016)

predictive model, the survey also consisted of the Community of Inquiry (CoI) Framework survey (Arbaugh et al., 2008) and the CAP Perceived Learning Scale (Rovai et al., 2009).

The CoI framework survey (Arbaugh et al., 2008) served as a predictor variable and was used to measure students' perceived teaching presence, social presence, and cognitive presence. The CoI framework survey consisted of 34 self-report items across three subscales: teaching presence, social presence, and cognitive presence. Responses utilized a 5-point Likert-type scale with 1 indicating "strongly disagree" and 5 indicating "strongly agree." Scores ranged from 0-136 for the composite CoI survey, 0-52 on the teaching presence scale, 0-36 on the social presence scale, and 0-48 on the cognitive presence scale. Higher scores indicated higher levels of perceived presence, with lower scores indicating lower levels of perceived presence. The survey has good construct validity (Arbaugh et al., 2008) with a reported Cronbach's coefficient alpha of .94, .91, and .95 for teaching presence, social presence, and cognitive presence, respectively.

The CAP Perceived Learning Scale measures overall perceived learning by examining the three components of perceived learning: cognitive, affective, and psychomotor (Rovai et al., 2009). This instrument has been validated for use in both online and face-to-face environments and has been deemed to have good construct reliability, with a reported Cronbach's alpha of .79 (Rovai et al., 2009). Scores range from 0 to 54 on the composite scale and 0 to 18 on the subscales, with a higher score indicating an increased perception of learning. The scale consists of 9 self-report items. Participants selected their response using a 5-point Likert-type scale, with 1 meaning "strongly disagree" and 5 meaning "strongly agree".

Students' end-of-course grades served as the criterion variable. Students' end-of-course grades were obtained from the university registrar at the end of the semester (week eight) and

were reported as a percentage. The maximum percentage that students could earn in each course was 100%. The grading scale for the university is shown in Table 2.

Table 2

University Grading Scale

A	95.00-100.00	**C**	65.00-69.99
A-	90.00-94.99	**C-**	60.00-64.99
B+	85.00-89.99	**D+**	55.00-59.99
B	80.00-84.99	**D**	50.00-54.99
B-	75.00-79.99	**D-**	45.00-49.99
C+	70.00-74.99	**F**	0.00-44.99

Results

In order to analyze how students' sense of community and perceived learning predicts their end-of-course grades while simultaneously controlling for demographic variables, step-wise hierarchical multiple regression was used. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. Four extreme outliers were noted; thus, four cases were removed, bringing the total number of cases to 258. Assumptions after removal of the extreme outliers were tenable. Descriptive statistics are reported in Table 3.

Following educational research convention and prior development of the predictive model (Rockinson-Szapkiw et al., 2016), demographics (gender, age, ethnicity, and native language) were entered at step 1 and did not reach statistical significance, $F(3, 254) = 1.33$, $p = .27$, $R^2 = .02$. CoI framework survey scores (teaching presence, social presence, and cognitive presence) were entered at step 2 and did not reach statistical significance, $F(6, 251) = .76$, $p = .60$, $R^2 = .02$. The CAP Perceived Learning Scale scores (cognitive learning, affective learning, and psychomotor learning) were entered at step 3 and did not reach statistical significance, $F(9,$

248) = .83, p = .59, R^2 = .03. Thus, no variables made a unique statistically significant contribution to the model. The results of the change models and individual contributions of each variable in the final model are shown in Table 4.

Table 3

Descriptive Statistics

	M	*SD*	*n*
Community of Inquiry			
Teaching Presence	57.86	8.01	258
Social Presence	37.12	6.26	258
Cognitive Presence	51.35	7.23	258
Perceived Learning			
Cognitive Learning	11.31	1.96	258
Affective Learning	12.27	2.21	258
Psychomotor Learning	12.21	2.18	258
End of Course Grades	93.75	4.06	258

Table 4

Hierarchical Regression Model

	R^2 Change	*F* Ratio for R^2 Change	B	SE	β	*t*	*p*
Step 1	.02	1.33					
Step 2	.00	.21					
Step 3	.01	.98					
Gender			.95	.61	.10	1.56	.12
Ethnicity			-.60	4.21	-.01	-.14	.89
Native Language			.06	.07	.06	.86	.39
Teaching Presence			.01	.05	.03	.25	.80
Social Presence			-.01	.07	-.01	-.11	.92
Cognitive Presence			.06	.06	.11	.94	.35
Cognitive Learning			.01	.16	.01	.08	.94
Affective Learning			-.28	.17	-.15	-1.68	.10
Psychomotor Learning			.01	.15	.01	.07	.95

α = .05

Discussion

Contrary to a previous study (Rockinson-Szapkiw et al., 2016), the results of this investigation revealed that CoI and perceived learning did not predict student's end-of-course grades, specifically with an international student population. No relationship was found between students' composite CoI framework survey scores and end-of-course grades, teaching presence and end-of-course grades, social presence and end-of-course grades, or cognitive presence and end-of-course grades. These findings are contrary to previous research that shows that a positive relationship exists between teaching presence and student grades; that is, the higher the levels of presence, the more positive the student outcomes (Rockinson-Szapkiw et al., 2016; Swan et al., 2009). Additionally, no relationship was found between students' composite CAP Perceived Learning Scale scores and end-of-course grades, or the three subscales (cognitive learning, affective learning, and psychomotor learning) and end-of-course grades, respectively. These findings are also contrary to previous research that has shown a positive relationship between perceived learning and student grades (Rockinson-Szapkiw et al., 2016; Rovai et al., 2009).

There may be several reasons why no relationship was found between the factors studied. Experts in the field of education recognize and encourage the global shift towards a Westernized model of education, moving from teacher-centered instructional approaches to student-centered instructional approaches (Aneja, 2010). It is also recognized that all countries and, more specifically cultures, may not embrace this shift and, importantly, may not have the framework necessary to overcome the challenges of the impending globalization of education. As the majority of students involved in the current study were from India, it is important to examine the culture of education from which they hail as well as the role that India plays in the globalization of education. Aneja (2010) outlined several strengths and weaknesses of India's education

system and noted that the shift in the education paradigm (teacher-centered to student-centered and the inclusion of distance learning) has placed India as "a median between the eastern and western civilization" (p. 65). Thus, depending on students' past experiences with education, the micro-culture through which they view education, and their personal familial circumstances and characteristics, it is possible that culture and the paradigm shift toward Westernized education models may play a role in the results of this study as they contradict results found in previous study. Further research is needed in order to examine the complex interactions involved; future studies might focus on student background and familial characteristics, cultural view of education, resilience, interpersonal skills, and flexibility (Wang, 2009).

It is also recognized that some Asian cultures contribute to an increased power differential between students and instructors. Zhang (2013) found that, in some Asian cultures, "instructors were viewed by students as authorities, major sources of knowledge, and possessing high power" (p. 238), thus contributing to student anxiety and a decreased level of comfort in interacting with instructors. Thus, students in the current study may have been less likely to self-report negative responses due to the power differential. While no other method besides self-reporting can adequately measure students' perceptions, the use of a self-report instrument may have contributed to the results of this study. Additionally, all instructors for the courses included in this study were male; thus, an examination of student perceptions with female instructors may have led to different results. Further study, therefore, is needed to examine cultural influence and interaction factors as they relate to student outcomes (Zhang, 2013).

Finally, previous research findings suggest that Asian students may be less likely to interact with instructors (Kim, Ates, Grigsby, Kraker, & Micek, 2016) but more likely to interact with peers (Zhang, 2013). Students may be more comfortable interacting with peers due to

decreased power distance as compared to instructors. Thus, investigations that examine student sense of community and interactions with peers may provide further insight regarding factors that contribute to student success in U.S. graduate courses.

Limitations

As with any study, this study poses several limitations. As the majority of participants in this study were of Asian descent and primarily were from India, the critical aspect of cultural factors warrants further examination. As such, the results of this study may not be generalizable to other populations. Additionally, as only students enrolled in the School of Computer and Information Systems participated in this study, the results may not be generalizable to students enrolled in other types of programs. This study also did not examine instructor characteristics that, given the documented cultural practices of some Asian students, might introduce factors related to power distance, individual/collectivism, uncertainty/avoidance, and masculinity/femininity (Hofstede, 1986), thus warranting further examination. Likewise, this study did not examine the specific teaching practices that instructors utilized and what, if any, impact these teaching practices may have had on students' sense of community, perceptions of learning, or end-of-course grades. While the sample size was sufficient given research convention, a larger sample size might also produce different results and provide increased generalizability. It is suggested that for future study, researchers attempt to replicate this study with a similar population as well as with different populations and that researchers examine other factors that might influence student grades, including cultural factors, specific teaching practices, and length of time engaging in the computer-mediated learning environment. Additionally, the use of a self-report instrument may pose issues when considering the power differential between students and instructors in the higher education setting given cultural practices and beliefs. Thus,

the use of measurement instruments that do not rely on accuracy in self-reporting may yield different results.

Conclusion

While the predictive model examined in this study was not found to have a statistically significant relationship with student end-of-course grades with an international population, the results can contribute to current understanding of best practices in course design and delivery in higher education. That is, this study demonstrates that the current models used in the U.S. graduate-level education system may not apply to international students and that factors other than teaching presence, social presence, cognitive presence, and perceptions of learning influence student course grades. As international student enrollment in U.S. courses increases, it is imperative that U.S. institutions recognize the unique characteristics that international students bring to the classroom, including unique challenges, cultural practices, and belief systems. At present, U.S. institutions do not typically design and deliver instruction in ways that meet the needs of international students specifically, thus contributing to enhanced student barriers. Thus, further research is needed to explore the unique characteristics and experiences of international students and to examine the relationship between other factors and student course grades in order to ensure international students' success in U.S. courses.

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