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Effects of Simulated Student Interaction on Student Perceptions of Teaching Presence

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Effects of Simulated Student Interaction on Student Perceptions of Teaching Presence

In an online setting, students use threaded discussions to increase learning through social constructivism by developing meaningful exchanges among themselves (Akarasriworn & Ku, 2013; Kent, Laslo, & Rafaeli, 2016; Liam Rourke & Anderson, 2002). Online discussions also help to build social presence (Costley, 2016; Palloff & Pratt, 2007; Zydney, Denoyelles, & Kyeong-Ju Seo, 2012). They are beneficial for promoting engagement and critical thinking (Havard, Du, & Olinzock, 2005; Jeong, 2003; Williams, Pesko, & Jaramillo, 2015; Yang, 2008).

Despite these benefits, online discussions are not always as effective as instructors may desire. Students may fail to respond to discussion prompts as they are unengaged or unprepared for online learning. Their responses may lack the depth their instructors are seeking (Hewitt, 2005). An extensive search of the literature has uncovered few answers to these problems.

Studies (An, Shin, & Lim, 2009; Baran & Correia, 2009; Choi, Land, & Turgeon, 2008; Handley & Williams, 2011; Maurino, 2007; Murphy, Mahoney, Chen, Mendoza-Diaz, & Yang, 2005) indicate that some possible solutions include scaffolding, modeling, and student-led facilitation. An extensive search of the literature does not find research that addresses the impact that a simulated student's modeled behavior might have on discussion board interaction.

The purpose of this study was to explore the impact of the instructor posting in online discussions as a simulated student. Of particular interest to the instructor was the impact simulated student interaction (SSI) had on the instructor/student relationship. Student

perceptions were examined using a modified version of the Community of Inquiry (CoI) survey (Arbaugh et al., 2008) to determine what impact SSI had on teaching presence, cognitive presence, and social presence within the online classroom.

Literature Review

The CoI Framework and Development of the Survey

The CoI framework came about as a result of research conducted by Garrison, Anderson, and Archer (2000). The research team developed this model to identify those elements crucial for a successful higher education experience, where teachers and students interact around content and with one another to develop a true community of inquiry (Garrison et al., 2000). The model is shown in Figure 1.

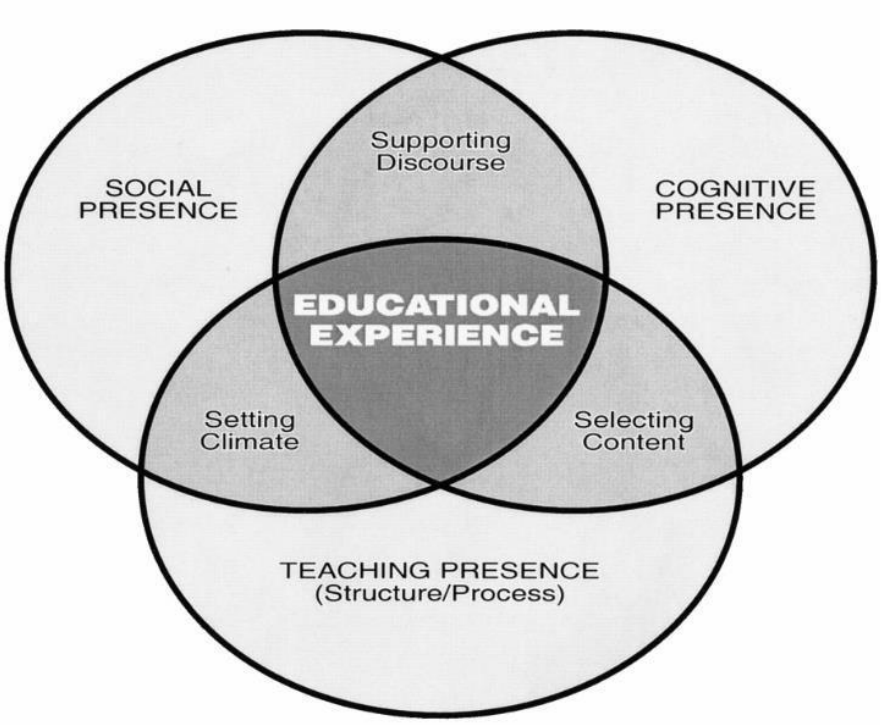

Figure 1: In the Community of Inquiry framework, learning occurs as a result of the interaction between the three elements; social presence, cognitive presence, and teaching presence (Garrison et al., 2000).

In this model, cognitive presence represents the ability of the student to construct meaning from content through sustained communication with other members of the community of inquiry. Garrison et al. (2000) posit this element as the most critical to student success as it represents a vital part of critical thinking, which the research team states is the goal of all higher education.

Social presence is the ability of students to inject something of themselves into the community of inquiry, thus representing themselves as real people to other members of the community (Garrison et al., 2000). The researchers state that social presence serves primarily as a support to critical thinking and cognitive presence. However, the researchers mention

that social presence can also support affective goals of the course that can directly contribute to student success.

The final element of the model is teaching presence. Garrison et al. (2000) state that the functions of teaching presence, although primarily the responsibility of the instructor in an educational environment, can be performed by any member of the community of inquiry. The first function of teaching presence is the design of the educational experience, and is almost always carried out by the instructor (Garrison et al., 2000). The second function is facilitation, which may be shared between the instructor and some or all of the participants. The goal of this element is to provide support to the other two, ensuring that instruction goals are realized.

The framework was examined extensively from its development through its first decade (Arbaugh, 2007; Garrison, Anderson, & Archer, 2010; Garrison & Arbaugh, 2007; Garrison, Cleveland-Innes, & Fung, 2010; Shea & Bidjerano, 2011; Swan & Ice, 2010). The CoI framework was cited more than 365 times according to Google Scholar by early 2008, when an instrument was developed and validated to measure the CoI framework quantitatively (Arbaugh et al., 2008). The resulting 34-item survey was tested in a multi-institutional study to support generalizability across institutions as well as providing evidence of the validity and reliability of the instrument (Arbaugh et al., 2008; Bangert, 2009; Swan et al., 2008). Results of the validation demonstrated the validity of both the cognitive and social presence constructs and indicated support for a third construct, teaching presence, which could be further factored into two functions of course design and facilitation (Arbaugh et al., 2008).

CoI in Online Environment

While the CoI framework has been used in research on blended environments (Bangert, 2009; Garrison, Cleveland-Innes, et al., 2010; Traver, Volchok, Bidjerano, & Shea, 2014; Wicks, Craft, Mason, Gritter, & Bolding, 2014), the vast majority of the studies focus on one or more of the constructs within online, computer-mediated, or other distance-delivered courses (Akyol & Garrison, 2011; Garrison et al., 2000; Garrison, Anderson, & Archer, 2001; Garrison, Cleveland- Innes, et al., 2010; Pecka, Kotcherlakota, & Berger, 2014; L Rourke, Anderson, Garrison, & Archer, 1999; Rubin, Fernandes, & Avgerinou, 2013; Shea & Bidjerano, 2009; Swan, Matthews, Bogle, Boles, & Day, 2012).

From its inception, the framework was designed as a means of comparison in the development of a community of inquiry in text-based, distance delivered communications as opposed to equivalent traditionally delivered oral encounters (Garrison et al., 2000). This establishes the framework and instrument as an effective mechanism in the study of asynchronous online communications through threaded discussion boards.

CoI in Online Discussions

Several studies have focused specifically on the development of a community of inquiry within asynchronous online discussions (Akyol & Garrison, 2011; Liu & Yang, 2014; Zydney et al., 2012). These studies have focused on how well online discussions foster the elements of cognitive presence, teaching presence, and social presence.

Akyol and Garrison (2011) studied metacognition in the online discussion board of a graduate class of 16 students. The course was designed according to the principles of the CoI framework and researchers used transcript analysis to study the posts of the students at

various points during the course. Researchers analyzed the posts for knowledge of cognition, monitoring of cognition, and regulation of cognition. Table 1 shows the changes of the student posts over time.

Table 1.

Percentages of dimensions of metacognition in online discussions.

	Number of messages	Metacognition Knowledge of cognition	Monitoring of cognition	Regulation of cognition
Discussion Week 1	53	39.6%	35.8%	41.5%
Discussion Week 5	82	36.6%	59.8%	51.2%
Discussion Week 9	76	22.4%	56.6%	60.5%

The researchers found that over time, knowledge of cognition dropped but student monitoring and regulation of cognition increased through their participation in online discussion boards.

In the study by Zydney et al., (2012), researchers studied the effectiveness of discussion protocols in an online setting that had previously found to be effective in face-to-face environments. The research team was hoping the use of protocols could help address limitations of online discussions such as limited levels of cognitive processing, student disconnect resulting from limited social interaction, and time constraints that limited instructors' ability to facilitate discussions (Zydney et al., 2012). The researchers studied online discussions in two fully online graduate classes of 12 students (protocol group) and 14 students (non-protocol group). They found that participants in the protocol group had a more balanced distribution of the three presences, which the researchers attribute to better representation of the interaction between the presences as demonstrated by the CoI framework.

Lui and Yang (2014) used the CoI framework to study students' knowledge construction through online discussions. Over a span of four discussion prompts designed by the instructor to gradually increase student higher order thinking according to Bloom's (Anderson et al., 2001) revised taxonomy, Lui and Yang examined the posts of a class of 36 undergraduate students.

Additionally, a survey was utilized to gather student perceptions and attitudes regarding online discourse. Researchers found that cognitive presence made up for the majority of student postings (n = 788 of 1,058 postings or 74.48%). Of these, while the majority of the posts were at the lower levels of Bloom's taxonomy (46.22% compared to 28.26% of posts at higher levels of Bloom's) the discussion prompt designed to promote higher order thinking had 4.3 times more higher level posts than the first discussion prompt. Discussion posts ranked similarly in levels of Bloom's to their designed purpose. The higher-level discussions also demonstrated higher levels of social presence. Researchers determined that introductory discussions were essential to constructing knowledge and a precursor to increased cognitive and social presence in discussions. Discussions focused on life experience were more satisfying to students and represented the highest levels of both cognitive and social presence. Cases represented high levels of cognitive presence but lower levels of social presence, causing the researchers to recommend integration of social events or personal experiences into these discussions to improve social presence. Debate style discussions demonstrated higher levels of social presence but lower cognitive presence. Researchers cautioned careful design and moderation of such forums to promote cognitive growth.

These three studies show a variety of ways the CoI framework has been used to study the effectiveness or design of online threaded discussions. Each of these researchers was interested in not only the levels of each element of the framework, but also in how the three elements interacted and the state of the community as a whole.

Method

Instrument Development

The full original 34 item CoI Survey (available in Appendix A) was piloted in the summer of 2014 at a small comprehensive university located in northeast Texas. This survey was administered to students enrolled in the same introductory special education course from which students in the intervention group would later be selected. Participation in the survey was voluntary; students were provided with an informed consent notice and permitted to opt out of the survey without penalty. Twenty-two students (of 34) opted to respond to the survey.

A factor analysis was conducted on the data and the top items from each factor in the instrument extracted to determine if the survey could be reduced without loss of reliability or validity. Cronbach's Alpha was run on the resulting factors, returning reliability scores of .956 for the factor of Teaching Presence now reduced to five items, .941 for the factor of Social Presence now reduced to five items, and .932 for the factor of Cognitive Presence now reduced to seven items. The resulting modified 17-item instrument shown in Appendix B demonstrated both validity and reliability.

Description of the Data Set

This modified CoI Survey was used in the fall of 2014 with three special education courses making up two groups; a control group and an intervention group. The intervention, which was termed simulated student interaction or SSI, consisted of the instructor posting to the Blackboard threaded discussion forum as a "simulated" student. Discussions were set up in both the control and intervention groups. These discussions revolved around non-fiction novels the students were required to read related to special education topics. In the intervention group only, the instructor, from her "student preview" account, posted discussions to the forums following the same schedule and requirements as the students. These posts were intended to demonstrate a proficient post to the students, as well as to engage the student in deeper conversation. Students were aware that this preview student, which was given the name "Aree Zona", was actually their instructor. In the control group, the discussions were conducted without participation by a simulated student. The use of SSI was the only difference in instruction between the two groups.

The survey was conducted twice with each group – at beginning and end of semester. The purpose of this survey was to measure the influence of SSI on teaching presence, social presence, and cognitive presence in the intervention group, compared to the pre-course survey and the control group.

Participation in the study was voluntary. Students were provided with an informed consent, and students were permitted to opt out of the survey without consequence. The two classes that made up the intervention group comprised 64 (undergraduate) students, and the one class that made up the control group comprised 20 (graduate) students. A total of 120 surveys were returned; 95 of these were valid. Of the returned surveys, 75 were from the

intervention group; 42 (of 64) students completed the pre-course survey and 33 (of 64) completed the post-course survey. Twenty participants were from the control group; 12 (of 20) students completed the pre-course survey and 8 (of 20) completed the post-course survey.

Validation of the Instrument

An initial Cronbach's Alpha was performed on all 17 of the variables. This returned a score of .966, indicating that the instrument as a whole was still reliable. According to Gliem & Gliem (2003), the closer a reliability score is to 1.0, the greater the internal consistency of the items in the scale, therefore this score is considered excellent. A factor analysis was run on the instrument, producing three clear factors that explained 81% of the variance. The individual instrument items mapped into their expected factors, namely cognitive presence, teaching presence, and social presence, as shown in Table 2. As mentioned earlier, cognitive presence represents the ability of the student to make meaning from content through communication with other members of the community. Social presence relates to the students' ability to project themselves into the community. Teaching presence has two functions, the design of the educational experience and class facilitation.

Table 2.

Rotated Component Matrix[a].

	Component		
	1	2	3
CogPres4	.835	.206	.317
CogPres7	.749	.387	.350
CogPres8	.730	.454	.327
CogPres10	.721	.420	.278
CogPres1	.720	.026	.436
CogPres9	.655	.532	.294
CogPres11	.650	.406	.402
TeachPres4	.094	.848	.140
TeachPres2	.295	.839	.247
TeachPres7	.333	.811	.325
TeachPres11	.475	.686	.367
TeachPres9	.510	.635	.228
SocialPres6	.283	.316	.847
SocialPres7	.384	.132	.844
SocialPres5	.328	.271	.818
SocialPres8	.411	.266	.761
SocialPres4	.258	.519	.688

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.[a]

a. Rotation converged in 6 iterations.

Reliability of the Instrument

To test the reliability of the instrument, Cronbach's Alpha was calculated for each factor. The factors of Teaching Presence returned a reliability score of .929. Table 3 shows the statistics of the analysis. A higher reliability score could be produced with the removal of the factor labeled TeachPres4, but that would reduce the survey to fewer than five items in a factor. Hinkin, Tracey, and Enz (1997) state that while no defined correct number of items is required to develop a reliable scale, scales of four to six items are generally considered

optimal. The reliability scores were similar with and without removal of the item so five items were retained.

Table 3.

Item-Total Statistics for the Teaching Presence factor.

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
TeachPres4	17.53	9.157	.681	.941
TeachPres2	17.44	8.964	.876	.902
TeachPres7	17.48	9.115	.902	.898
TeachPres11	17.57	8.626	.853	.905
TeachPres9	17.48	9.200	.788	.918

For the factor of Social Presence, Cronbach's Alpha produced a score of .941. Table 4 shows the item statistics. None of the items in this factor, if removed, would produce a higher reliability score.

Table 4.

Item-Total Statistics for the Social Presence factor.

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
SocialPres6	16.91	8.661	.895	.920
SocialPres7	17.14	8.162	.855	.925
SocialPres5	16.94	8.507	.862	.924
SocialPres8	17.00	8.426	.833	.929
SocialPres4	16.95	8.072	.788	.940

For the factor of Cognitive Presence, Cronbach's Alpha returned a reliability score of .952. As shown in Table 5, only removal of the item labeled CogPres1 would return a higher reliability score. Since the scores were similar with and without removal of the item, the factor was left intact.

Table 5.

Item-Total Statistics for the Cognitive Presence factor.

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
CogPres4	24.82	18.638	.853	.942
CogPres7	24.81	19.134	.901	.939
CogPres8	24.80	18.906	.897	.939
CogPres10	24.89	19.351	.810	.946
CogPres1	25.06	19.315	.727	.954
CogPres9	24.80	19.204	.831	.944
CogPres11	24.81	19.474	.843	.943

Multi-Dimensional Scaling (ALSCAL)

A multi-dimensional model was conducted using all 17 items to produce a three-dimensional solution with an RSQ of .94018. The three-dimensional solution showed the items for each of the three factors grouped together. The three plots produced are shown in Figures 2-4.

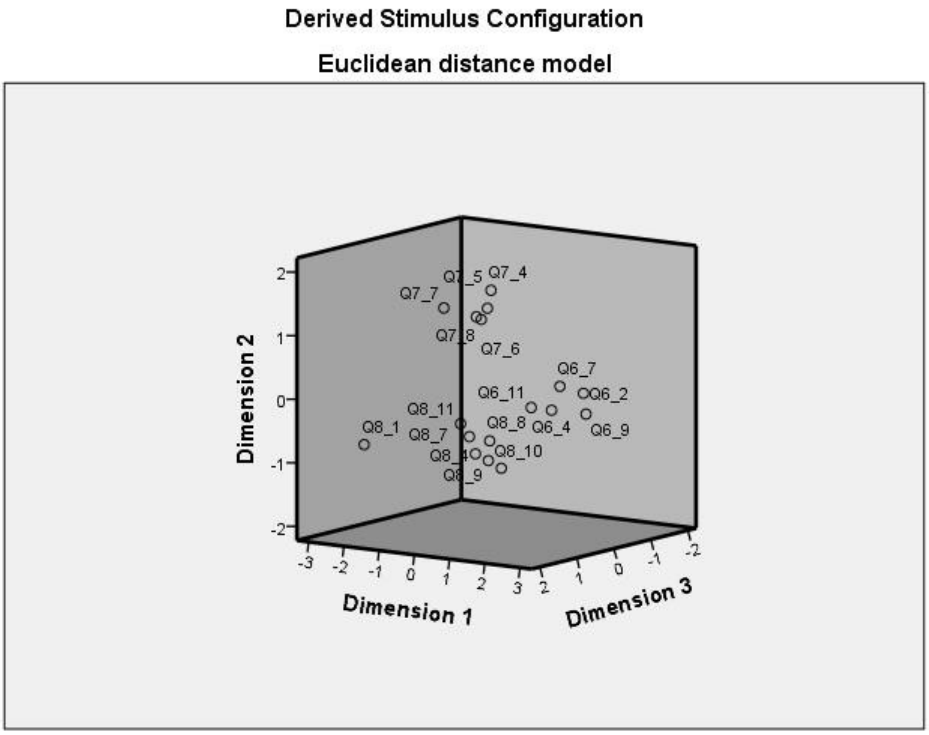

Figure 2. Three-dimensional solution to multi-dimensional scaling (ALSCAL).

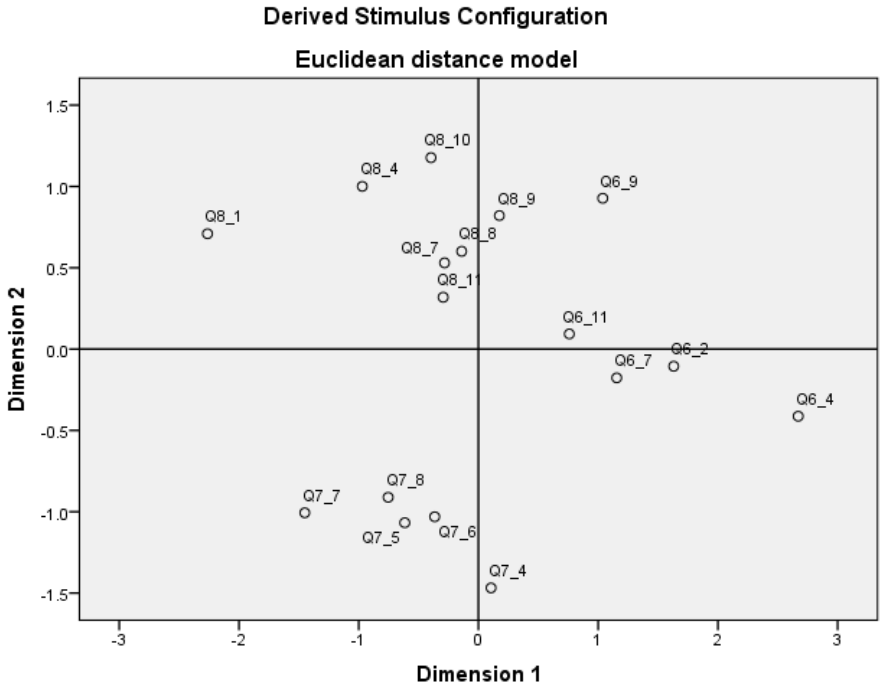

Figure 3. Two-dimensional solution to multi-dimensional scaling (ALSCAL).

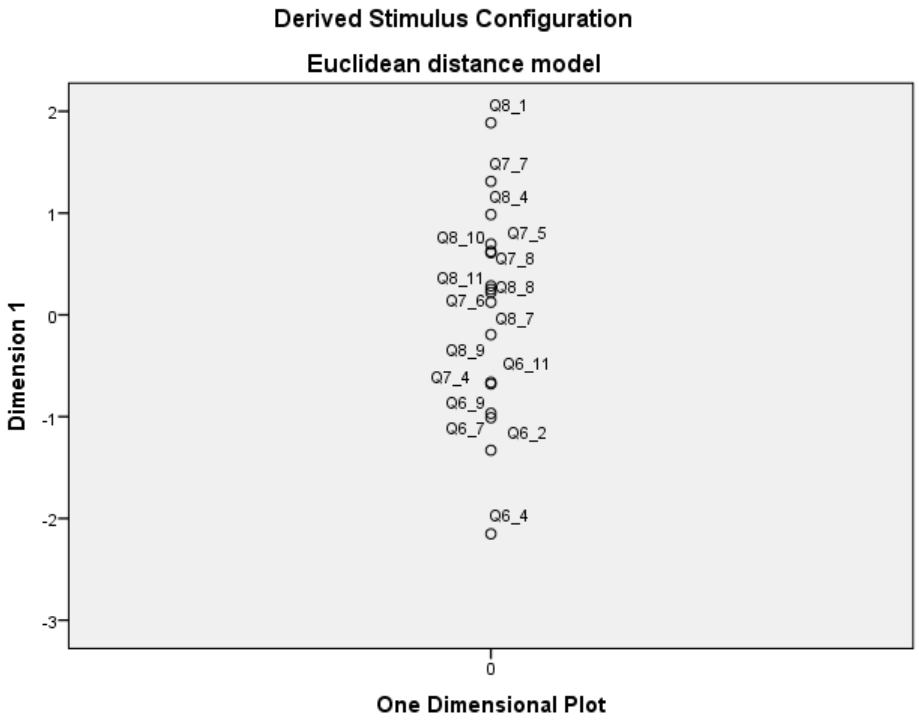

Figure 4. One-dimensional solution to multi-dimensional scaling (ALSCAL).

Data Analysis

An ANOVA was performed to compare the results of the pre-course and post-course surveys by group. There were no significant differences found between the pre and the post test of the control groups for Cognitive Presence $F(1,18) = .12$, $p = .74$; Teaching Presence $F(1,18) = .01$, $p = .92$; or Social Presence $F(1, 18) = .12$, $p = .74$. For the intervention group the post- test ($M = 4.40$, $SD = .53$) was significantly higher than the pre-test ($M = 3.90$, $SD = .80$) for Cognitive Presence $F(1, 73) = 9.56$, $p < .01$. For Teaching Presence the post-test ($M = 4.63$, $SD = .59$) was significantly higher than the pre-test ($M = 4.09$, $SD = .81$), $F(1, 73) = 8.47$, $p < .01$. This was also true for Social Presence, with the post-test mean of 4.48 and standard deviation of .58, and pre-test mean of 4.09 and standard deviation of .83, $F(1, 73) =$

5.44, $p < .05$ The ANOVA summary is shown in Table 6 while the descriptives are shown in Table 7.

Table 6

ANOVA Summary

Source	Sum of Squares	df	Mean Square	F	*p*
Control					
CogPres					
Between Groups	.061	1	.061	.118	.735
Within Groups	9.378	18	.521		
Total	9.440	19			
TeachPres					
Between Groups	.005	1	.005	.011	.916
Within Groups	8.417	18	.468		
Total	8.422	19			
SocPres					
Between Groups	.085	1	.085	.116	.737
Within Groups	13.204	18	.734		
Total	13.290	19			
Intervention					
CogPres					
Between Groups	4.626	1	4.626	9.564	.003
Within Groups	35.308	73	.484		
Total	39.934	74			
TeachPres					
Between Groups	4.453	1	4.453	8.469	.005
Within Groups	39.962	76	.526		
Total	44.415	77			
SocPres					
Between Groups	2.867	1	2.867	5.440	.022
Within Groups	38.990	74	.527		
Total	41.857	75			

Table 7

Descriptives

Group			N	Mean	Std. Deviation	Std. Error
Control	CogPres	Pre-Course Survey	12	4.1905	.82703	.23874
		Post-Course Survey	8	4.3036	.51472	.18198
		Total	20	4.2357	.70486	.15761
	TeachPres	Pre-Course Survey	12	4.5167	.79753	.23023
		Post-Course Survey	8	4.5500	.45040	.15924
		Total	20	4.5300	.66578	.14887
	SocPres	Pre-Course Survey	12	3.9917	.98392	.28403
		Post-Course Survey	8	4.1250	.60415	.21360
		Total	20	4.0450	.83633	.18701
Intervention	CogPres	Pre-Course Survey	42	3.8980	.80212	.12377
		Post-Course Survey	33	4.3983	.52823	.09195
		Total	75	4.1181	.73460	.08482
	TeachPres	Pre-Course Survey	45	4.1467	.81173	.12101
		Post-Course Survey	33	4.6303	.58549	.10192
		Total	78	4.3513	.75948	.08599
	SocPres	Pre-Course Survey	43	4.0930	.82155	.12529
		Post-Course Survey	33	4.4848	.57669	.10039
		Total	76	4.2632	.74706	.08569

A Pearson's correlation was computed. For the control group the pre-course/post-course surveys were not significantly related to the factors while for the intervention group the pre-course/post-course surveys were significantly related to all the factors: Social Presence, $p < .05$; Cognitive Presence, $p < .01$; and Teaching Presence, $p < .01$. Results of this analysis are shown in Table 8.

Table 8

Correlations of pre-course/post-course surveys by group.

Group	Social Presence	Cognitive Presence	Teaching Presence
Control	.080	.081	.025
Intervention	.262*	.340**	.317*

Note. * = statistically significant at $p < .05$ level. ** = statistically significant at $p < .01$ level.

A MANOVA was performed on the data to determine the overall effects of the intervention by group and when the survey was delivered. The results of the MANOVA were inconclusive, due to the crossover effect when comparing the means of the groups by pre- and post-course surveys. The analysis indicates that for two of the three factors, prior to the intervention, the control group scored higher on the instrument than the intervention group; however, after the intervention the results are reversed. The plots produced by this analysis are shown in Figures 5 through 7.

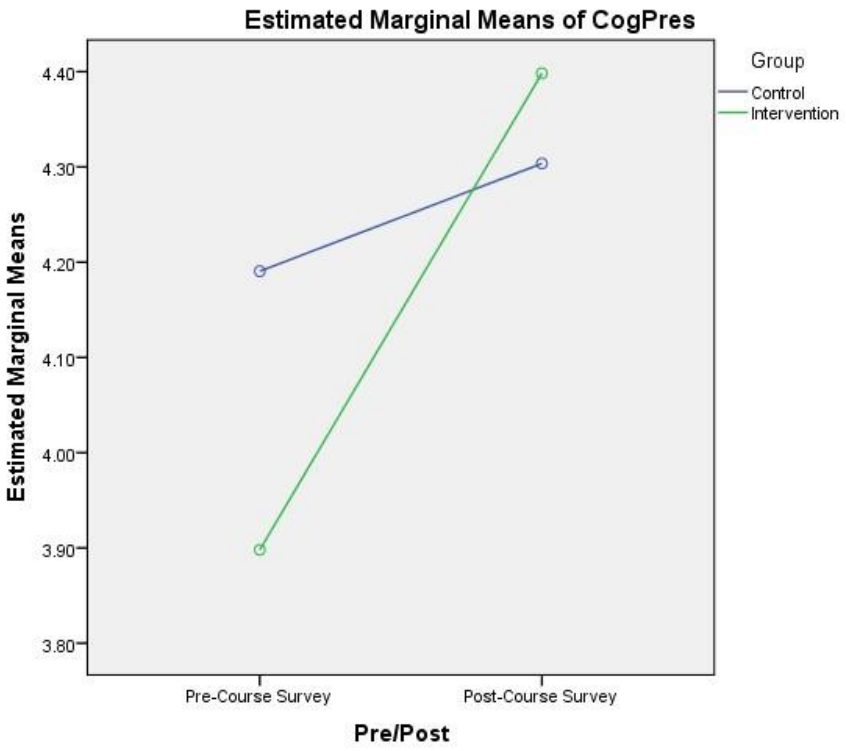

Figure 5. The MANOVA for comparison of the three factors by pre-course and post-course survey and group showed crossed means for Cognitive Presence, rendering the data unreliable.

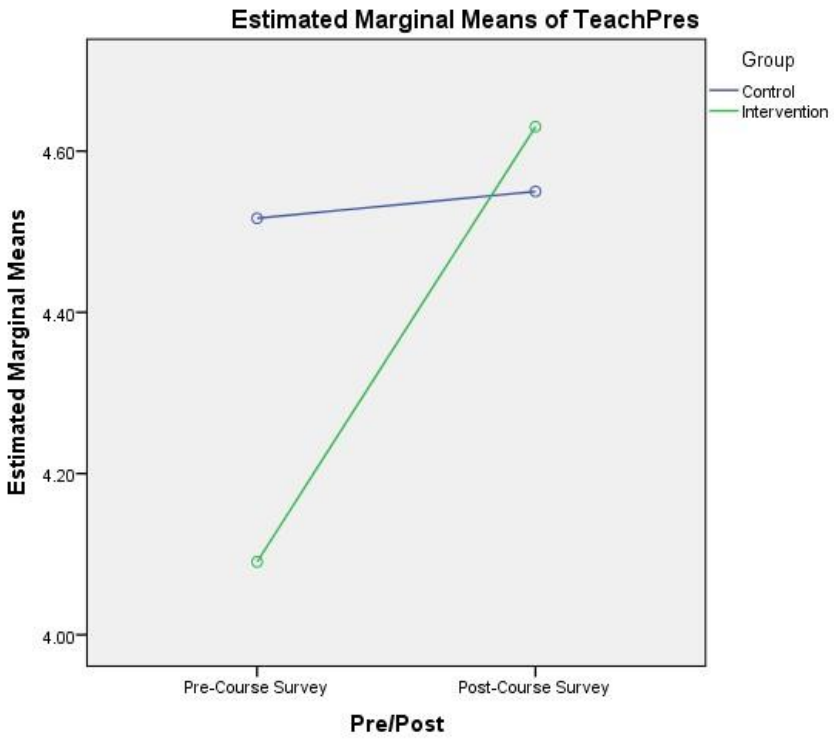

Figure 6. The MANOVA for comparison of the three factors by pre-course and post-course survey and group showed crossed means for Teaching Presence, rendering the data unreliable.

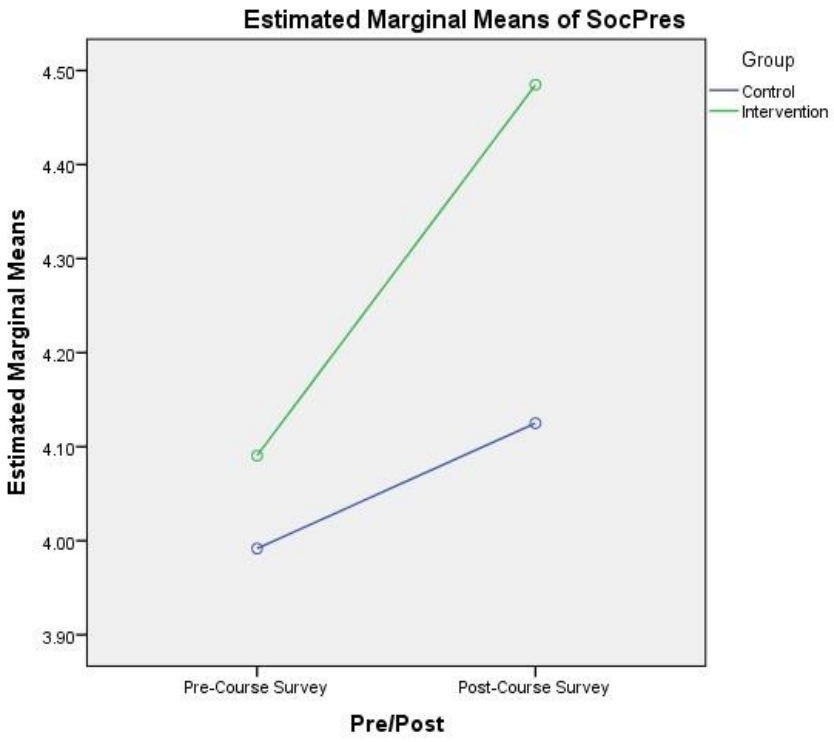

Figure 7. Social Presence was the only factor that produced a usable plot in the MANOVA comparison of the three factors by pre- and post-course survey and group.

The MANOVA showed statistical significance for some of the individual factors, but not in the pre/post comparison. The results of the MANOVA are shown in Table 9.

Table 9

Tests of Between-Subjects Effects

Source	Dependent Variable	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	CogPres	4.906[a]	3	1.635	3.330	.023	.099
	TeachPres	6.035[b]	3	2.012	3.948	.011	.115
	SocPres	3.717[c]	3	1.239	2.161	.098	.066
Intercept	CogPres	1074.177	1	1074.177	2187.474	.000	.960
	TeachPres	1205.556	1	1205.556	2366.254	.000	.963
	SocPres	1061.638	1	1061.638	1851.359	.000	.953
Group	CogPres	.149	1	.149	.304	.583	.003
	TeachPres	.456	1	.456	.895	.347	.010
	SocPres	.802	1	.802	1.398	.240	.015
PrePost	CogPres	1.434	1	1.434	2.920	.091	.031
	TeachPres	1.252	1	1.252	2.457	.120	.026
	SocPres	1.061	1	1.061	1.850	.177	.020
Group * PrePost	CogPres	.571	1	.571	1.163	.284	.013
	TeachPres	.977	1	.977	1.919	.169	.021
	SocPres	.260	1	.260	.453	.503	.005
Error	CogPres	44.686	91	.491			
	TeachPres	46.363	91	.509			
	SocPres	52.183	91	.573			
Total	CogPres	1680.102	95				
	TeachPres	1867.040	95				
	SocPres	1746.010	95				
Corrected Total	CogPres	49.592	94				
	TeachPres	52.397	94				
	SocPres	55.900	94				

Due to the issues with the MANOVA crossed means, an effect size calculator which computed mean differences of groups with unequal sample size within a pre-post design was utilized to determine if there was an educationally meaningful difference between the two groups (Lenhard & Lenhard, 2015). According to the developers of this calculator, when the pretest means and standard deviations of the control and intervention groups do not match, Klauer (2001 as cited in Lenhard & Lenhard, 2015) "proposes to compute g for both groups and to substract them afterwards. This way, different sample sizes and pre-test values are automatically corrected" (section 3, paragraph 1). The effect size calculator showed an effect

size of 0.542 (*dKorr)* for Cognitive Presence, which indicates an intermediate effect. For Teaching Presence, the effect size was 0.67 (*dKorr),* which indicates an intermediate effect. For Social Presence, there was an intermediate effect size of 0.504 (*dKorr).* In each of these three cases, the difference between the intervention group and control group was educationally meaningful.

Discussion

The modified survey as analyzed by factor analysis and Cronbach's alpha was demonstrated to be as reliable and valid as the original instrument validated by Arbaugh et al. (2008). Both the overall alpha score (.966) and individual reliability scores of .956 for Teaching Presence, .941 for Social Presence, and .932 for Cognitive Presence indicate the modified 17 item instrument is internally consistent and as reliable as the full original 34 item instrument.

Factor analysis identified three clear constructs as expected, indicating instrument validity. Multidimensional scaling also indicated three factors and grouped the questions into the expected factor.

Using this modified survey, students in the intervention group answered significantly more favorably on the post-course survey compared to the pre-course survey than students in the control group. Both the ANOVA and Pearson's correlations indicate a significant difference between the pre- and post-course survey for the intervention group for all three factors, with no significant change for the control group. This could indicate that SSI has an impact on student perceptions of cognitive, social, and teaching presence. Of particular interest in this survey was the impact on teaching presence, which was significant at the 0.01

level. This may have been an indication that students in the SSI courses felt closer to their instructor than students in the control group. Effect sizes indicated that these results are likely be educationally significant, with all three factors returning a significance in the intermediate range according to Cohen (1988) and in the zone of desired effects per Hattie (2009).

Limitations to this study included the small group sizes, use of a convenience sample, and the use of a single institution and discipline. Additionally, the mismatched size and difference in pre-test means between the control group and intervention group confounded the results of the MANOVA, rendering this analysis inconclusive.

Conclusion

Asynchronous discussions are an important part of online instruction. Effective use of online discussions can increase student engagement and critical thinking. The COI survey has often been used to analyze student perceptions of online discussions, including its use to measure the effectiveness of a particular treatment or protocol within such discussions. This study examined the effect of an instructor interacting as a student within an online discussion. Findings indicate this treatment may be effective at increasing student perceptions of teaching presence, cognitive presence, and social presence. Results of the hierarchical cluster analysis may provide unique insights into instructional practices in online discussions.

Despite educationally meaningful effect sizes, the results of this study may not be generalizable due to use of small, non-random groups. Further studies should include random assignment of participants to groups of equal size and experiences. Additional research could also be done into establishing a safe online environment and how trust or the lack thereof impacts student interaction. The implications of activating student interest on learning and higher order thinking related to content could also be an extension of this research. More

extensive studies extended to multiple disciplines and institutions would also help to corroborate the findings in this study.

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Appendix A: Community of Inquiry Questionnaire (full original)

Teaching Presence

1. The instructor clearly communicated important course topics.
2. The instructor clearly communicated important course goals.
3. The instructor provided clear instructions on how to participate in course learning activities.
4. The instructor clearly communicated important due dates/time frames for learning activities.
5. The instructor was helpful in identifying areas of agreement and disagreement on course topics that helped me to learn.
6. The instructor was helpful in guiding the class towards understanding course topics in a way that helped me clarify my thinking.
7. The instructor helped to keep course participants engaged and participating in productive dialogue.
8. The instructor helped keep the course participants on task in a way that helped me to learn.
9. The instructor encouraged course participants to explore new concepts in this course.
10. Instructor actions reinforced the development of a sense of community among course participants.
11. The instructor helped to focus discussion on relevant issues in a way that helped me to learn.
12. The instructor provided feedback that helped me understand my strengths and weaknesses.

13. The instructor provided feedback in a timely fashion.

Social Presence

1. Getting to know other course participants gave me a sense of belonging in the course.
2. I was able to form distinct impressions of some course participants.
3. Online or web-based communication is an excellent medium for social interaction.
4. I felt comfortable conversing through the online medium.
5. I felt comfortable participating in the course discussions.
6. I felt comfortable interacting with other course participants.
7. I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.
8. I felt that my point of view was acknowledged by other course participants.
9. Online discussions help me to develop a sense of collaboration.

Cognitive Presence

1. Problems posed increased my interest in course issues.
2. Course activities piqued my curiosity.
3. I felt motivated to explore content related questions.
4. I utilized a variety of information sources to explore problems posed in this course.
5. Brainstorming and finding relevant information helped me resolve content related questions.
6. Online discussions were valuable in helping me appreciate different perspectives.
7. Combining new information helped me answer questions raised in course activities.
8. Learning activities helped me construct explanations/solutions.

9. Reflection on course content and discussions helped me understand fundamental concepts in this class.
10. I can describe ways to test and apply the knowledge created in this course.
11. I have developed solutions to course problems that can be applied in practice.
12. I can apply the knowledge created in this course to my work or other non-class related activities.

5 point Likert-type scale:

1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

Appendix B: Modified Instrument

Teaching Presence

2: The instructor clearly communicated important course goals.

4: The instructor clearly communicated important due dates/time frames for learning activities.

7: The instructor helped to keep course participants engaged and participating in productive dialogue.

9: The instructor encouraged course participants to explore new concepts in this course.

11: The instructor helped to focus discussion on relevant issues in a way that helped me to learn.

Social Presence

4: I felt comfortable conversing through the online medium. 5: I felt comfortable participating in the course discussions.

6: I felt comfortable interacting with other course participants.

7: I felt comfortable disagreeing with other course participants while still maintaining a sense of trust.

8: I felt that my point of view was acknowledged by other course participants.

Cognitive Presence

1: Problems posed increased my interest in course issues.

4: I utilized a variety of information sources to explore problems posed in this course.

7: Combining new information helped me answer questions raised in course activities.

8: Learning activities helped me construct explanations/solutions.

9: Reflection on course content and discussions helped me understand fundamental concepts in this class.

10: I can describe ways to test and apply the knowledge created in this course.

11: I have developed solutions to course problems that can be applied in practice.

5 point Likert-type scale:

1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree