

# Examining the Characteristics and Content of Instructor Discussion Interaction upon Student Outcomes in an Online Course

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## Abstract

Teaching presence facilitates students' social and cognitive presence in online courses. Instructor interaction in discussion forums, a widely adopted instructional strategy, establishes teaching presence but research on the optimal frequency and content of instructor interaction in discussion is underdeveloped. This research evaluated 1625 instructor posts in 36 graduate-level courses in education to determine their impact on students' perceptions of the quality of the instructor and course, students' perceptions of their learning, and students' actual achievement. Findings suggest the frequency of instructor interaction in discussion has no effect on student outcomes, but posts that are instructional improve students' perceptions of their learning, and posts that are conversational improve students' perceptions of instructor and course quality, and their actual academic achievement. Implications for instructors and policymakers are addressed.

*Keywords:* Online learning, instructional strategy, instructor engagement, Community of Inquiry, teaching presence, discussion, instructor interaction

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The literature on distance education is unwavering about two conclusions: adult students should be in control of their own learning (Knowles, 1988; Merriam, Caffarella, & Baumgartner, 2007) but want their instructors to be engaged in their courses (Mazzolini & Maddison, 2007). What is not clear are the types, frequency, and characteristics of instructor engagement that result in the most significant student outcomes (Baran, Correia & Thompson, 2011; Kauffman, 2015; Means, Toyama, Murphy, Bakia & Jones, 2010). This research explored one common type of instructor engagement—interaction in discussion forums—to determine the extent to which frequency and contents of instructor discussion interaction impacted students' academic and satisfaction outcomes. Findings may inform policies regarding instructor engagement in online courses.

## **Theoretical Framework**

In their highly regarded principles for good practice, Chickering and Gamson (1987) lauded the impact of interaction between the faculty and students, reciprocity and cooperation between students, and active learning of the content. Moore and Kearsley (1996) noted that three critical interactions must take place for students learning online: teacher-student interaction, student-student interaction, and student-content interaction. Similarly, Garrison, Anderson, and Archer (2000) suggested an online course becomes a Community of Inquiry (CoI) when students experience teaching presence, social presence, and cognitive presence that foster deep and meaningful learning. Teaching presence is “the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes” (Anderson, Rourke, Garrison, & Archer, 2001, p. 5). Teaching presence is observable in content selection and format, facilitation of the designed course, and confirmation of understanding through assessment and feedback (Annand, 2011; Garrison et al., 2000). Social presence occurs when the student is able to “identify with a group, communicate purposefully in a trusting environment, and develop personal and affective relationships progressively by way of projecting their individual personalities” (Garrison, 2011, p. 23). Students experience social presence when they perceive they have projected their true self, socially and emotionally, into the learning environment (Garrison et al., 2000). Cognitive presence is “the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse in a critical community of inquiry” (Garrison, Anderson, & Archer, 2001, p. 11). The philosophical underpinning of the CoI framework aligns with the social-constructivist view that communication interaction of the teacher, student, and content is essential to learning (Akyol & Garrison, 2011).

Activities associated with teaching presence may have the most direct influence on students’ academic achievement (Rockinson-Szapkiw, Wendt, Wighting, & Nisbet, 2016). Instructor activities in an online course account for the most significant impact on student outcomes—higher than student-student interaction and student-content interaction (Marks, Sibley, & Arbaugh, 2005). Teaching presence through course design, content selection, discussion facilitation, direct instruction, communication and feedback directly contribute to students’ perceptions of support, perceptions of learning, and their final grades (Arbaugh, 2014; Whipp & Lorentz, 2009).

Students in an online course attain the highest levels of learning when there is structured interaction (Garrison & Cleveland-Innes, 2005). Teaching presence in the form of facilitating interaction is critical to positive student outcomes (Garrison & Cleveland-Innes, 2004).

In fulfillment of this component of teaching presence, the teacher regularly reads and comments on student postings...modeling appropriate behaviors, commenting upon and encouraging student responses, drawing in the less active participants, and curtailing the effusive comments of those who tend to dominate the virtual space (Anderson, Rourke, Garrison & Archer, 2001, p. 7).

Instructors must take a leadership role in discussion to guide students to deep learning and knowledge construction (Garrison & Cleveland-Innes, 2005).

## **Teaching Presence and Online Discussion**

The shifting role of the instructor to “guide on the side” should not mean the instructor takes a passive role (Marks et al., 2005). Student-centered, student-driven learning requires that

the instructor assume the position of facilitator (Baran et al., 2011). “Facilitation is the facet of teaching presence that ensures that social presence is established among community members and, in turn, that cognitive processes are directed to personally meaningful and educationally worthwhile outcomes” (Vaughan, Cleveland-Innes, & Garrison, 2013).

Facilitation in the form of instructor interaction in discussion forums is a function of teaching presence, and largely acknowledged as an expected practice in teaching online courses (Davidson-Shivers, 2009; Mandernach, Gonzalez, & Garrett, 2006; Nandi, Hamilton, & Harland, 2012). Students desire instructor-led facilitation because the instructor is the content expert, can ensure the discussion stays focused on the content, is qualified to resolve conflict among students, and can motivate students to contribute to the discussion (Hew, 2015; Phirangee, Epp, & Hewitt, 2016; Tello, 2007). Students’ sense of community may be higher in discussions facilitated by their instructor than in discussions facilitated by peers (Phirangee et al., 2016).

While research suggests teaching presence as a construct or group of strategies has a strong influence on students’ outcomes, the literature is varied on the specific effect of instructor interaction in discussion forums on student achievement or satisfaction (Means et al., 2010). Cho and Tobias (2016) researched this problem using three sections of the same course taught by the same instructor. In one section there was no online discussion, in the second section an online discussion was present but only students interacted in the discussion, and in the third section an online discussion was present and both students and the instructor interacted. The researchers found students’ perception of social presence was higher in the two sections where discussion was present, but there was no difference in students’ perceptions of teaching presence or cognitive presence in any of the three sections. As well, they found no difference in students’ satisfaction or their grades among the three sections. Students were engaged in their courses and believed their instructor was present regardless of whether the instructor participated in discussion.

Research conducted by Tello (2007) revealed no relationship between the frequency of instructor interaction in discussion forums and students’ persistence in their online course. In a large study of 40,000 discussion posts and 375 students, Mazzolini and Maddison (2007) found a negative correlation between the frequency of instructor postings and student postings; the more prominent the instructor was in discussion, the less prominent the students were. As well, they found a negative correlation between the length of a discussion thread and instructor interaction; the more engaged the instructor was in discussion, the shorter the discussion threads. Students’ perceptions of the usefulness of discussion forums was not related to the frequency with which their instructor posted, nor was their satisfaction with the course. Despite that, survey data revealed students rated the enthusiasm and expertise of the instructor more highly when the instructor posted at the wrap-up of a discussion, and qualitative findings of the Mazzolini and Maddison study revealed almost half of the students’ comments noted appreciation when their instructor interacted in the course discussion.

Hosler and Arend found that facilitated discourse from an instructor contributed to students’ cognitive presence (2012), but Cranney, Wallace, Alexander, and Alfano (2011) found no relationship between the frequency with which instructors posted discussion and students’ discussion grades. Ertmer and Koehler (2015) found the frequency of students’ postings was not related to the frequency of instructor postings. However, they interpreted the quality of the discussion more highly with an instructor’s presence.

Administrators may grapple with whether policies should be enacted to require specific frequency and timing of instructors' discussion posts (Cranney et al., 2011; Mandernach, Gonzalez, & Garrett, 2006), but research does not appear to support a relationship between the frequency of instructor postings and students' outcomes. The purpose of this study was to test the findings of current literature on frequency of instructor discussion posts on students' outcomes, and to determine whether the content of instructor posts would serve as a more accurate measure of the impact of teaching presence through instructor interaction in discussion forums on students' perceived and actual learning, and students' satisfaction with their online instructor and course. The following research questions were used to guide the study:

1. Is there a relationship between the frequency of instructor discussion posts and
  - a. students' perceptions of the quality of their instructor?
  - b. students' perceptions of the quality of their course?
  - c. students' perceptions of their learning?
  - d. students' actual achievement?
2. To what extent is there a relationship between the contents of instructor discussion posts and
  - a. students' perceptions of the quality of their instructor?
  - b. students' perceptions of the quality of their course?
  - c. students' perceptions of learning?
  - d. students' actual achievement?

## Methods

This quantitative ex-post facto research was conducted using data collected from 36 online sections of 13 graduate courses in education between May of 2015 and July of 2016 at a nonprofit private college in the Midwest. Enrollment during the data collection period comprised 546 students, all licensed teachers pursuing an endorsement or master's degree in education.

The graduate program used template courses developed by content experts, and therefore all sections of a course contained identical content, discussion prompts, and assessments. Courses offered during the summer term consisted of seven modules over seven weeks, and courses offered during the fall and spring terms consisted of eight modules over eight weeks. All courses required students to contribute in discussion forums, though the courses did not require an identical number of discussions.

Fourteen instructors taught courses in the graduate program during the data collection period, and 13 provided consent to allow data from their courses to be used in the study. Though faculty were encouraged to participate in discussion forums, no policy was in place to mandate participation during the data collection period.

## Operationalization of Variables

For this research, instructor interaction in discussion was measured with two independent variables: frequency of posts in discussion forums and the contents of instructor posts in discussion forums. Only discussion forums intended for teacher-student and student-student interaction surrounding a targeted discussion question were evaluated; this research was interested in the intentional communication of an instructor in discussion forums to promote deep learning, focus the discussion, encourage student participation, and direct and extend discussion on the content

(Anderson, Rourke, Garrison, & Archer, 2001; Nandi et al., 2012; Vaughan et al., 2013). For that reason, instructor posts to forums for students' initial introductions and students' questions were not considered.

Students' satisfaction and achievement outcomes were the dependent variables of interest. Course evaluation data, including the rating of "excellent teacher" and "excellent course" were used for evidence of students' satisfaction. Student achievement was evidenced by students' rating of "progress on relevant learning objectives" from course evaluation data, and students' actual final course grades.

## Data Sources

**Course evaluations.** All courses in this study were evaluated by students in the final week of their online course using the IDEA Student Ratings of Instruction (SRI) Diagnostic Feedback course evaluation tool. The IDEA measures student perceptions of their progress on relevant learning objectives and observations of teaching methods, while controlling for extraneous factors like students' work habits and motivation (IDEA, nd). The Diagnostic Form contains 19 Likert-style questions in the area of teaching methods, 13 Likert-style questions in the area of learning objectives, 6 Likert-style questions on student and course characteristics, and 2 Likert-style summary items (Li, Benton, Brown, Sullivan, & Ryalls, 2016). The form concludes with an opportunity for students to leave qualitative feedback regarding the instructor or course. Interrater reliability testing of the IDEA SRI Diagnostic Feedback form was conducted by Li et al. (2016), and 40 of the 41 questions resulted in reliability coefficients of .80 or above. One question related to discussion groups and teams had a coefficient of .73, but the item was retained because of its importance in measuring collaborative learning. Strong correlation between students' average rating of progress on objectives and instructors' rating of course objectives led researchers to conclude that the tool had sufficient criterion validity.

Students' responses to the online IDEA SRI Diagnostic Feedback form are submitted directly to IDEA; the individual responses cannot be viewed by faculty members or administrators. IDEA analyzes the data to determine a mean score between 1 and 5 for each of the 41 questions on the SRI Diagnostic Form. Controlling for extraneous factors, IDEA also determines a mean score between 1 and 5 in four summative areas: students' perceived progress on relevant learning objectives (progress on relevant objectives), students' rating of the quality of their instructor (excellent teacher), students' rating of the quality of their course (excellent course), and an overall score summarizing students' feedback (summary evaluation). This summative data is provided to the institution in report form. The report includes the discipline average student rating for each area, which indicates the mean score of all student ratings in the IDEA database pertaining to the discipline associated with the course. The report also includes the institution average student rating for each area, which indicates the mean score of all student ratings collected for the institution. Those two mean scores for each area provide context to interpret whether the individual instructor's ratings are similar or dissimilar from the student ratings of other instructors.

A link to the course evaluation was embedded in the final module of each online course in Blackboard during the data collection period. The link was active in the seven days prior to the final day of the course. Students received reminder emails to complete the course evaluation every two days, and the reminder emails also contained a direct link to the course evaluation. No points or incentives were awarded by any instructor to students for the completion of course evaluations during the data collection period.

**Discussions.** Blackboard Learn was the learning management system (LMS) in place during the timeframe of interest for data collection. The discussion tool was used exclusively for discussion interaction; no intentionally structured discussion interaction occurred outside this tool in this LMS. Discussion questions were developed as discussion forums, and were in place before each course began. Each discussion question required students to post an initial discussion response by Wednesday of the related week, then follow up with two participation posts by Sunday at midnight, for a minimum of three required interactions per discussion question.

**Student achievement.** Students' assignment grades were recorded by instructors in the grade center in Blackboard for each course in this study at the research site during the research period. Final course grades, expressed as a percentage, were automatically calculated from assignment grades by Blackboard for each student in each course. An average final course grade was calculated for each course by adding the final percentage for each student and dividing by the number of students in the course.

### **Qualitative Analysis of Instructors' Discussion Interactions**

To determine frequency and contents of instructors' discussion interactions, all discussion posts shared by the 13 instructors in the 36 online graduate courses in education between May of 2015 and July of 2016 were copied into an Excel spreadsheet. Each interaction was labeled with the instructor's name to ensure discussion interactions were attributed to the appropriate instructor. The researcher carefully read each instructor discussion interaction to determine the contents of the interaction. Similar interactions were grouped into new tabs within the spreadsheet. The tabs were labeled with a single word that best described the group, and the words were revised as additional pieces of data were added and themes emerged. This process employed an interactive model of qualitative data analysis; the data was reduced and displayed to summarize, organize and assemble the data to identify patterns (Punch, 2009).

The patterns found in the contents of the instructors' discussion posts included interactions that were instructional, encouraging, questioning, conversational, acknowledging, evaluative, and operational. These categories are closely aligned to instructor discussion interactions recognized in the Community of Inquiry literature as indicators of teaching presence by Vaughan, Cleveland-Innes, and Garrison (2013), Nandi, Hamilton, and Harland (2012), Shea, Hayes, and Vickers (2010) and Anderson, et al. (2001).

**Instructional.** Instructor interaction included posts that provided new information to the discussion, clarified an area of confusion, or shared resources to improve understanding. Archer et al. (2001) suggested instructors interject knowledge from diverse sources and present content. Cleveland et al. (2013) recommended instructors' facilitation include posts that refer students to resources including textbooks, the Internet, and their own personal experience. Nandi et al. (2012) found instructors' discussion posts are commonly used to promote deep learning and provide clarification of students' questions. Shea et al. (2010) observed "direct instruction" as a pattern in instructor interactions, where instructors provided analogies, illustrations, demonstrations, clarifying information, and knowledge from diverse sources.

This example typifies an instructional post from an instructor:

Kara, you noted you suspect you have some ELL students who are underachieving. I'd encourage you to use assessments specific to language acquisition before agreeing with your colleagues who insinuate a child isn't achieving because of

laziness. It takes an ELL student 3-5 years to become proficient in oral English and 5-7 years to become proficient in academic English (Sparks, 2016). That means a student may be able to converse with you just fine but be challenged to apply his language skills in writing or in academic work. If you have assessment data that gives strong evidence that the child is underperforming, consider the six motivation deficits presented in this RTI Toolkit (Wright, 2012). I would encourage you to work hard to be the person who stops those conversations about lazy kids. In my experience, teachers and the monotonous work they can assign (hello worksheets!) can contribute significantly to lack of motivation. Class, check out the toolkit. How does this fit with what you are learning about ELL students and the stages of language acquisition?

Sparks, S. (2011). Teaching English-language learners: What does the research tell us? *Edweek.org* 35(30).

Wright, J. (2012). Six reasons why students are unmotivated (and what teachers can do). Paper presented at the Technical Assistance Meeting for CSE Chairpersons, Lake Placid, NY.

**Encouraging.** Instructor interaction included posts that provided support, affirmed a student's position or actions, and praised a student for their contribution or actions. Archer et al. (2001) and Vaughan et al. (2013) suggested instructors improve cognitive presence with interactions that encourage, acknowledge, and reinforce students' contributions. Shea et al. (2010) observed that instructors exhibited teaching presence with interactions that facilitated discourse by encouraging their online students.

This example typifies an encouraging post from an instructor: "It can be hard to tell someone that you need more from them. As a good leader, you coached her instead of grumbling to your peers about her. Excellent leadership skills."

**Questioning.** Instructors from this sample shared posts that posed a leading question but offered no information or encouragement, typically shared to stimulate additional discussion. Archer et al. (2001) suggested that an instructor share interaction intended to identify areas of agreement and disagreement, draw in participants and promote discussion. Nandi et al. (2012) found instructors commonly share posts that raise new questions and intervene to direct and extend discussion. Similarly, Vaughan et al. (2013) found instructors can improve cognitive presence with interaction that draws in participants, prompts further discussion, and identifies areas of agreement and disagreement, and Shea et al. (2010) observed that instructors facilitated discourse by identifying areas of agreement and disagreement and prompting discussion to engage students.

This example typifies a questioning post from an instructor: "I am fascinated at your comment that you create different rubrics for each student. What do you base your rubrics on? Standards? Skills? Or from IEP's? Do you have multiple criteria or are they specific to a specific skill?"

**Conversational.** Instructor discussion in this sample commonly included posts that were conversational in nature, that shared a story or thought not explicitly intended to improve student learning of the content, provided a glimpse at the personality or character of the instructor, or elaborated on a student's thought without providing instruction. Archer et al. (2001) suggested instructor interaction should set the climate for learning and draw in participants. Similarly,

Vaughan et al. (2013) found instructors could improve cognitive presence through posts that maintain a comfortable climate for learning and engage participants in the discussion. Nandi et al. (2012) found instructors share participation that extends discussion. Shea et al. (2010) observed instructors' interaction facilitated discourse by setting the climate for learning.

These two examples typify conversational posts from an instructor:

Differentiating instruction spoke volumes to me as a momma of a child with an IEP!

Kami, I was excited to see you reference the CITW strategies in this post. Of course our text is just a starting point, but it has good solid strategies. It's somewhat challenging to work through this class in the summer because you can't implement what you are learning, but it is also a good time to reflect on the year and think about what you might do differently next year. I'd really love to hear when you land on a strategy from the text or from a student in this class that makes you say "I need more information on that--I want to see the research, because this one might work when I .... in math/reading/etc." I hope you are getting good take-aways!

**Acknowledging.** Instructors in this sample shared discussion interaction that recognized a student's contribution to the discussion without offering praise of a specific idea or action. Archer et al. (2001) and Vaughan et al. (2013) noted cognitive presence may be improved by instructor interaction that acknowledges and reinforces the contributions of students. Shea et al. (2010) observed that instructors facilitated discourse by acknowledging and reinforcing student contributions.

This example typifies an acknowledging post from an instructor: "Thanks for sharing your goal. I'm glad the activity and your reflection helped you establish the next step to take."

**Negative Evaluative and Positive Evaluative.** Some instructors in this sample chose to share posts that corrected or praised the quality of a student's post, the length of a student's post, or a student's use of APA formatting. These posts were not specific to the student's understanding of the content, but rather to their competence in meeting the requirements of the course. The researcher chose to analyze the effect of evaluative posts separately as positive and negative to determine whether either had a different impact on students' satisfaction or achievement. Instructors in this sample were not dissimilar to those studied by other researchers. Anderson et al. (2001) suggested instructors' interaction assess the efficacy of the interaction process. Nandi et al. (2012) found instructor participation was at times used to assert administrative guidelines or provide technical assistance. Shea et al. (2010) observed teaching presence in instructor interactions that provided formative assessment for discussions.

This example typifies a negative evaluative post from an instructor:

Your posts for this discussion question cause me to believe that you agree with many of the points that Linda Darling-Hammond made in her article "It's Time for a New Accountability in American Education" article. It would have been very powerful if you had supported your comments and experiences with summaries or quotes from the article.

This example typifies a positive evaluative post from an instructor:

Thanks for sharing your experiences, both professionally and personally, with homework. You also included a reference to the CITW text, which is a component that I'm looking for in the Discussions.

**Operational.** Instructors in this sample provided support related to a student's concern about navigation in the learning management system, linking to course content, or accessing materials shared in the content-specific discussion forums. These posts were shared within the content-specific discussion forums, not a forum specific to students' questions. Archer et al. (2001) suggested instructors engage in interaction that responds to students' technical concerns, and Nandi et al. (2012) found instructors commonly share posts that provide technical assistance and provide clarification of students' questions. Shea et al. (2010) observed teaching presence in instructor interaction surrounding the design and operation of the course, including responding to students' technical problems.

This example typifies an operational post from an instructor:

You will want to change your settings for your Google slide. Open the file, click on share. In the new window, click on sharable Link. In the new window, you need to change the settings to "anyone with the link can view". This will allow us to click on the link and see your show without needing you to give each of us permissions.

### **Quantitative Analysis of Instructors' Discussion Interactions**

Following the categorization of all instructor posts, the number of occurrences of each type of instructor discussion interaction (instructional, encouraging, questioning, conversational, acknowledging, evaluative, and operational) was recorded for each of the 36 courses. An Excel spreadsheet was created to record data on the independent and dependent variables. For every course included in the sample, the following information was recorded: instructor, course ID, course, course enrollment, percent of students who completed the IDEA course evaluation, mean score from the IDEA course evaluation for "progress on relevant learning objectives," "excellent teacher," "excellent course," and "summary evaluation," final course grade, number of weeks the course was in session, number of discussion questions in the course, total number of instructor posts, and frequency of each type of post. The spreadsheet was uploaded into IBM SPSS Statistics 20 for analysis.

**Statistical analysis.** To determine whether a relationship existed between the overall frequency of instructor discussion interactions and student outcomes, including the students' perception of the quality of the instructor and course, their perception of their progress on the learning outcomes of the course, and their actual academic achievement, a bivariate correlation analysis was conducted. This test was selected to identify the presence of a relationship, and there was no attempt to control or manipulate the variable pairs (Gravetter & Wallnau, 2007). For each pair, frequency of instructor discussion interaction was the independent variable and the type of student outcome was the dependent variable. Significance was determined for pairs with a *p* value less than or equal to .05.

To determine the effect of any relationships between the contents of instructors' discussion interactions and student outcomes, two statistical tests were conducted. Bivariate correlation analysis was used to determine if a relationship existed between the frequency of each type of instructor discussion interaction—instructional, encouraging, questioning, conversational, acknowledging, evaluative, and operational—and each type of student outcome, including

students' perceptions of the quality of the instructor and course, their perception of their progress on the learning outcomes of the course, and their actual academic achievement. Significance was determined for relationships with a p value less than or equal to .05.

Stepwise linear regression analysis was employed to determine whether a prediction model could be established between the frequency of each type of instructor discussion interaction and student outcomes. Stepwise linear regression is a forward selection technique where predictor variables are added to the model one at a time, and only retained if the F statistic p value remains below the specified alpha. As each variable is added, all variables retained in the model are re-evaluated for significance (Beal, nd).

### Threats to Validity

Before data could be accurately analyzed, two potential threats to validity were addressed: the number of weeks in each course, and the number of students in each course. Courses offered in this sample operated for 7 or 8 weeks. To account for the risk that the number of weeks influenced the total number of instructor posts, an adjusted total was determined for all 7-week courses in this way:

$$\frac{\text{total number of posts in 7-week course}}{7 \text{ weeks}} + \text{total number of posts} = \text{adjusted total}$$

To account for the risk that the total number of students in a course influenced the total number of instructor posts, an average number of posts given per student was calculated for all courses in this way:

$$\frac{\text{adjusted total number of posts}}{\text{total number of students}} = \text{average number of posts given per student}$$

An average number of posts per student was calculated for all categories that defined the contents of posts, including instructional, questioning, encouraging, acknowledging, conversational, negative evaluative, positive evaluative and operational.

## Results

### Descriptive Statistics

A total of N = 546 students was included in this sample, and n = 259 chose to complete the IDEA SRI Diagnostic Form for a response rate of 47.4%. Class size ranged from 7 to 22 graduate students, with an average of 15.2 students per class. The average course grade in the 36 graduate courses in education ranged from 86.68% to 99.69%, with an average overall course grade of M = 96.1, SD = 2.4.

While discussion was required in every course, the total number of discussion forums per course ranged from 4 to 15, with an average of 11.06 discussions per course. Instructors were not required to interact in the content-specific discussion forums, and interaction in those forums ranged from no posts to 243 posts in a course. There was no relationship between the number of content-specific discussion questions in a course and the adjusted total number of posts shared by an instructor,  $r(34) = -0.1$ ,  $p = .562$ . Due to the lack of relationship, no further adjustments were made to the average number of posts given per student.

The total number of instructor discussion posts, excluding the initial discussion questions, was 1625. Of those, 607 were instructional, 354 were questioning, 243 were encouraging, 172 were acknowledging, 138 were conversational, 16 were negative evaluative, 54 were positive evaluative, and 41 were operational (See Table 1).

Contents of Instructor Discussion Interaction	Frequency of Instructor Discussion Interactions
Instructional	607
Questioning	354
Encouraging	243
Acknowledging	172
Conversational	138
Negative Evaluative	16
Positive Evaluative	54
Operational	41
Total Instructor Discussion Interactions	1625

Table 1. Compiled Distribution of Instructor Discussion Interaction

**RQ1: Is there a relationship between the frequency of instructor discussion posts and students' satisfaction and achievement outcomes?**

Using bivariate correlation analysis with a  $p < 0.05$  for significance, it was found that there was no relationship between the adjusted total number of instructor posts and students' rating of the quality of their instructor,  $r(24) = .202$ ,  $p = .237$ . There was no relationship between the adjusted total number of instructor posts and students' rating of the quality of their online course,  $r(34) = .248$ ,  $p = .145$ . There was no relationship between the adjusted total number of instructor posts and students' perceptions of their progress on relevant course objectives,  $r(34) = .294$ ,  $p = .081$ . There was no relationship between the adjusted total number of instructor posts and students' summary evaluation of the course,  $r(34) = .275$ ,  $p = .105$ .

To account for the possible impact of course size on the adjusted total number of posts shared by an instructor, the average number of instructor posts per student was analyzed in comparison with students' course evaluation ratings. There was no relationship between the average number of instructor posts per student and students' rating of the quality of their instructor,  $r(34) = .161$ ,  $p = .347$ . There was no relationship between the average number of instructor posts per student and students' rating of the quality of their course,  $r(34) = .21$ ,  $p = .221$ . There was no relationship between the average number of instructor posts per student and students' perception of their progress on relevant course objectives,  $r(34) = .286$ ,  $p = .091$ . There was no relationship between the average number of instructor posts per student and students' summary evaluation of the course,  $r(34) = .245$ ,  $p = .15$ .

There was no relationship between the adjusted total number of posts shared by an instructor in a course and the average student grade in the course,  $r(34) = .086$ ,  $p = .616$ . There

was no relationship between the average number of instructor posts per student in a course and the average student grade in the course,  $r(34) = .082$ ,  $p = .634$ .

**RQ2: Is there a relationship between the contents of instructor discussion posts and students' satisfaction and achievement outcomes?**

Bivariate correlation analysis with a  $p < .05$  significance level was used to determine whether there was a relationship between the average number of occurrences each student in a course received of each specific type of instructor discussion post and the students' satisfaction and achievement outcomes (Table 2).

	Instructional Posts	Questioning Posts	Encouraging Posts	Acknowledging Posts	Conversational Posts	Negative Evaluative Posts	Positive Evaluative Posts	Operational Posts
<b>Excellent Teacher</b>								
Pearson Correlation	.273	.079	.109	-.086	.428**	-.216	-.292	.075
Significance (2-tailed)	.107	.645	.526	.618	.009	.206	.083	.665
<b>Excellent Course</b>								
Pearson Correlation	.315	.106	.144	.003	.398*	-.133	-.255	.139
Significance (2-tailed)	.061	.537	.403	.985	.016	.438	.133	.420
<b>Progress on Learning Objectives</b>								
Pearson Correlation	.377*	.179	.205	.122	.377*	-.059	-.089	.134
Significance (2-tailed)	.023	.296	.230	.480	.024	.734	.606	.437
<b>Summary Evaluation</b>								
Pearson Correlation		.140	.168	.028	.413*	-.133	-.212	.133
Significance (2-tailed)	.358*	.032	.417	.326	.871	.012	.440	.214
<b>Average Student Grade</b>								
Pearson Correlation	.186	.103	.087	.037	.334*	.061	.048	.066
Significance (2-tailed)	.277	.551	.613	.829	.047	.725	.782	.703

\* Correlation is significant at the .05 level (2-tailed)

\*\* Correlation is significant at the .01 level (2-tailed)

*Table 2. Relationship Between Contents of Instructor Discussion and Student Outcomes*

There was a significant positive relationship between the number of instructional posts an instructor shared per student and the students' perception that they made progress on the relevant learning objectives of the course,  $r(34) = .377, p = .023$ . There was a significant positive relationship between the number of instructional posts an instructor shared per student and students' overall summary evaluation of their course,  $r(34) = .358, p = .032$ . There was a significant positive relationship between the number of conversational posts an instructor shared per student and the students' perception of the quality of the instructor,  $r(34) = .428, p = .009$ , the students' perception of the quality of the course,  $r(34) = .398, p = .016$ , the students' perception of their progress on the relevant learning objectives,  $r(34) = .377, p = .024$ , the students overall summary of the course,  $r(34) = .413, p = .012$ , and the actual average student grade for the course,  $r(34) = .334, p = .047$ . No other significant correlations were uncovered.

While there was no relationship between the overall frequency of instructor posts or the average number of posts per student, there were relationships between the frequency of specific types of instructor posts suggesting some types of posts have more value to students than others. Stepwise linear regression analysis was employed to determine whether a prediction model could be established between the frequency of each type of instructor post, adjusted to reflect class sizes for 8-week courses, and the outcomes of excellent teacher, excellent course, overall summary, progress on relevant learning objectives and actual average course grade.

A significant regression equation was found to predict students' rating of 'excellent teacher' based on frequency of an instructor's conversational posts, ( $F(1, 34) = 7.604, p = .009$ ). The correlation coefficient was .428, indicating that 18.3% of the variance in students' perceptions of the quality of their teacher could be predicted by the frequency with which the instructor shared conversational posts. No other type of discussion post was predictive of students' rating of "excellent teacher."

A significant regression equation was calculated to predict students' ratings of 'excellent course' based on frequency of an instructor's conversational posts, ( $F(1, 34) = 6.398, p = .016$ ). The correlation coefficient was .398, indicating that 15.8% of the variance in students' perceptions of the quality of their course could be predicted by the frequency with which the instructor shared conversational posts. No other type of discussion post was predictive of students' rating of "excellent course."

Similarly, a significant regression equation was calculated to predict students overall summary rating of their course based on the frequency of an instructor's conversational posts, ( $F(1, 34) = 7.003, p = .012$ ). The correlation coefficient was .413, indicating that 17.1% of the students' overall summary evaluation of their course could be predicted by the frequency with which the instructor shared conversational posts. No other type of discussion post was predictive of students' summative rating of their course.

A significant regression equation was calculated to predict progress on relevant learning objectives based on the frequency of an instructor's instructional posts and negative evaluative posts, ( $F(2, 33) = 5.309, p = .01$ ). (The correlation coefficient was .493, indicating that 24.3% of the variance in students' perceptions of their progress on learning objectives could be predicted by the frequency of instructional and negative evaluative posts. It is important to note the coefficient for negative evaluative was -1.478, suggesting the presence of negative evaluative posts by an instructor diminished a students' perception of their progress on relevant learning objectives. No

other type of discussion post was predictive of students' perception of their progress on relevant learning objectives.

A significant regression equation was calculated to predict students' actual course grade based on the frequency of an instructor's conversational posts, ( $F(1, 34) = 4.259, p = .047$ ). The correlation coefficient was .334, indicating that 11.1% of the variance in students' actual course grade could be predicted by the frequency their instructor shared conversational discussion posts. No other type of discussion post was predictive of students' actual course grade.

## Discussion

Research from Mandernach, Dailey-Hebert and Donnelly-Sallee (2007) and Cranney, Wallace, Alexander and Alfano (2011) found instructors spend 6-7 hours each week teaching online, with almost half that time spent in discussion with students. While faculty agree interaction in discussion is a necessary instructional practice (Cranney et al., 2011; Mandernach, Gonzalez & Garrett, 2006), there is little research to support the notion that a specific required number of instructor discussion posts results in optimal student outcomes (Cranney et al., 2011; Mazzolini & Maddison, 2007; Tello, 2007). This research supports the literature; frequency of instructor interaction in discussion forums had no significant impact on students' perceptions of the quality of their teacher, their course, their perception of learning or their actual achievement.

However, the contents of an instructor's discussion post were significantly related to students' satisfaction and achievement outcomes. Findings both support and challenge recommendations made by proponents of the Community of Inquiry framework, who suggest specific types of teaching presence improve students' cognitive and social presence—at least with respect to online interaction between an instructor and adult students in discussion forums. Instructor discussion interaction that encouraged, acknowledged, and reinforced students' contributions (Anderson et al., 2001; Vaughan et al., 2013) provoked no change in students' perceptions of their course, instructor, or learning in this study. Similarly, instructor discussion interaction that attempted to draw in participants, promote discussion, summarize the discussion, and respond to technical concerns had no effect. Instructors who attempt to establish teaching presence by responding frequently to students with posts of acknowledgement, affirmation, praise, and summary should redirect their efforts to other types of discussion interaction and engagement practices.

While Nandi (2012) found instructors commonly use discussion interaction to share administrative guidelines, and Anderson et al. (2001) and Vaughan (2013) recommended using instructor interaction to assess the efficacy of the process of discussion, this research found posts written by instructors that attempted to correct students who fell short of guidelines actually have a negative impact on students' perceptions of their learning. It may be more beneficial to reserve critical evaluation and redirection for feedback directly with the student, not in the public venue of a discussion forum.

One of the types of facilitation in discussion forums that had measurable impact on students' outcomes was the use of instructional posts. Instructional posts align with recommendations made by proponents of CoI to establish teaching presence by presenting content and providing resources to improve learning (Anderson et al., 2001; Shea et al., 2010; Vaughan,

2013). Students rated their perception of their progress on the relevant learning objectives of the course to be higher when their instructor provided instructional posts.

Most surprising, this research found the use of conversational posts by an instructor significantly improved students' perception of the quality of the teacher, the quality of their course, their overall summary of the course and even appeared to have a small impact on students' actual achievement. Conversational posts were those that improved the instructor's social presence, revealing the instructor's personality or character, e.g. "It is wonderful to look within our extended family and find such support. My aunts are twins. I am 56 years old and they are 66 years old. I still find encouragement and support from them." They provided an opportunity for instructors to share stories. "My kiddos did a recipe book, and they could choose which recipe to explain. One child did a recipe on brownies, and they said, 'Add a Tablespoon of brown.' " They demonstrated ways the instructor perceived events, situations or resources.

I saw this same article recently - another 'teacher friend' posted on Facebook how she really wanted to make sure she paid attention to this. I found it fascinating and was so glad to see so many teachers respond to her post that they had read and were pondering the information.

They went beyond praise or affirmation, but may not have provided instruction.

Wow! I was impressed with how Jady's reading improved just over the course of that lesson. It was neat to see her work with sequencing skills. I wonder how she would do if she didn't have the pictures on those word strips. (That would be a great thing to try!)

I bet she felt like a movie star!

Anderson et al. (2001) noted that "the social aspects of the teacher's messages that directly relate to the content contributions from the student are included in the teaching presence category" (p. 4). Swan and Shih (2005) found students had much higher satisfaction with their instructors when their instructors exhibited the social aspects of teaching presence. Establishing teaching presence by facilitating discourse through instructor interaction in discussion "overlaps with many of the behaviors identified in [the] larger model of social presence as the teacher is an active member of the community of inquiry. However, the teacher's role is more demanding than that of other participants, and carries with it higher levels of responsibility for establishing and maintaining the discourse that creates and sustains social presence" (Anderson et al., 2001, p. 7). Shea, Hayes, Uzuner-Smith, Gozza-Cohen, Vickers, and Bidjerano (2014) found the social dimension of teaching online to be so intertwined with teaching presence they recommended a reconceptualized Community of Inquiry framework that included the construct of social-teaching presence.

The pattern of conversational posts might best align to the recommendation of Anderson et al. (2001) and Vaughan et al. (2013) to focus interaction on creating and maintaining a comfortable climate for learning. Recent literature on the construct of "third space"—the intangible space where teachers and students work together to find common ground (Schiewer, 2009)—may best describe where conversational posts live. The conversational posts shared by instructors in this research were typically related to the content and therefore could not be categorized as "chat," but were not specifically intended for instruction. They fostered the social presence of the instructor as a "real person," not an extension of the computer.

## **Limitations**

This research used end-of-course evaluations to collect data on students' perceptions of the quality of their course and instructor and their perception of learning. The response rate for course evaluations was 47.4%; slightly less than half of the students in graduate courses in education at a private nonprofit college during the period of the study completed a course evaluation. Students who chose not to respond may have held different perceptions that would have changed the findings of the research. All student participants were working adults in a professional field pursuing a master's degree. Results may not be generalizable to other populations, including traditional undergraduate students taking an online course to supplement their program of study, working adults in a degree completion program, nontraditional adult students pursuing degrees in a field other than education, and students at public or private for-profit institution of higher education.

## **Suggestions for Future Research**

This research was conducted with data from online graduate students in education who were working professionals. Future research may test these findings with different types of online learners to determine whether instructional and conversational instructor interaction in discussion is equally effective with other populations. Shea et al. (2010) suggested the majority of teaching presence through instructor interaction occurs outside of discussion forums. Other forms of interaction between the instructor and student, including email, feedback, phone calls, texts, and announcements should be evaluated for their individual and collective impact on student outcomes. Because instructional and conversational posts accounted for less than 25% of the variance in the dependent variables of student satisfaction and achievement, researchers must continue to drill down to determine which nuances of commonly adopted online instructional strategies are most effective.

## **Conclusion**

Instructor interaction in discussion forums is a commonly accepted instructional practice in online courses, but there is some debate as to whether instructor discussion interaction improves student outcomes and whether policies should be enacted to require instructors to participate with prescribed regularity. The findings of this research suggest the type of instructor discussion interaction, not the quantity, improves students' perceptions of the quality of their instructor, the quality of their course, their perception of learning, and their actual achievement. Instructors should direct the time they spend in discussion to posts that focus on instruction and posts that develop students' sense of the instructor as a real person.

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