This is a repository copy of *Teaching presence in computer conferencing learning environments: Effects on interaction, cognition and learning uptake*.

White Rose Research Online URL for this paper:
http://eprints.whiterose.ac.uk/121078/

Version: Accepted Version

Teaching presence in computer conferencing learning environments: effects on interaction, cognition and learning uptake

Abstract

This exploratory study examined how the level and nature of teaching presence impacted two online forum discussions from three dimensions: participation and interaction, cognitive presence, and knowledge development via assimilating peer messages. Effects on participation and interaction were graphically depicted. Effects on cognitive presence and knowledge construction via assimilating messages were suggested via statistical analysis, followed by qualitative interpretations. Twenty six tertiary online learners with varied demographic backgrounds participated in the study for six weeks.

The results showed that the nature of teaching presence in the study, specified to teacher initiation, roles of teaching presence, and means of making teaching presence, largely shaped the impact of teaching presence on learning. A higher level of teaching presence was observed to be associated with a lower level of student participation, peer interaction, cognitive presence, and learning uptake. Based on the results, implications for integrating and researching teaching presence in computer conferences were provided.

Introduction

Although the roles and responsibilities of online tutors are well documented (Berge, 2008; Darabi, Sikorski, & Harvey, 2006; Salmon, 2011; Swan, 2001), how tutor activities impact online learning is less well researched (Arbaugh & Hwang, 2006; Baran, Coreia, & Thompson, 2011). However, as Baran, et al. (2011) suggested, studies on online tutor roles are important as they provide information about factors that contribute to effective online learning and how online teachers might be trained and supported. The current study explored the impact of teacher roles on learning in two online forums, through the lens of the Community of Inquiry (CoI) model. As the most widely used model in computer conferencing studies (e.g. de Leng, Dolmans, Jöbsis, Muijtjens, & van der Vleuten, 2009; Kim, Kwon, & Cho, 2011; Murphy, 2004; P.

Shea & Bidjerano, 2009, 2010), the CoI model suggests that effective teacher intervention facilitates developing a high level of cognitive presence (Arbaugh et al., 2008; D. R. Garrison, 2007; D. R. Garrison, Cleveland-Innes, & Fung, 2010).

Cognitive presence

Cognitive presence encompasses the activities in which participants are able to construct meaning through sustained communication (D. R. Garrison, Anderson, & Archer, 1999). Cognitive presence consists of four stages, namely, *triggering events*, *exploration*, *integration*, and *resolution* (D. R. Garrison, Anderson, & Archer, 2001). *Triggering events* identifies an issue or problem that emerges from experience. *Exploration* is characterised by brainstorming, questioning, and exchange of information. *Integration* assesses the applicability of ideas to the issue or event under discussion. *Resolution* implements the proposed solution or tests the hypothesis by means of practical application.

The Community of Inquiry (CoI) framework suggests that cognitive development is more easily sustained when a significant degree of social presence is established because social presence develops learners' awareness of each other's existence and contributions (Arnold & Ducate, 2006; D. R. Garrison & Anderson, 2003; D. R. Garrison et al., 1999). Garrison (2009) argued that social presence reflects the ability of participants to identify with the community, communicate purposefully in a trusting environment and develop interpersonal relationships by way of projecting their individual personalities (p. 352). His assertion has been substantiated in the authors (2013) wherein higher levels of cognitive phases were observed to be associated with an optimal level of social presence which encouraged participation, positively shaped the dynamics of interaction, and thereby promoted collaboration.

Cognitive success also depends on teaching presence and teachers must provide students with structure and leadership for students to engage and perform high levels of thinking and knowledge construction (D. R. Garrison & Cleveland-Innes, 2005).

Teaching presence

Teaching presence is the design, facilitation, and direction of cognitive and social processes for the purpose of realising meaningful and educationally worthwhile outcomes (Anderson, Rourke, Garrison, & Archer, 2001; D. R. Garrison et al., 2001). Anderson, et al. (2001) suggested that it was through active teacher intervention that computer conferencing became a useful instructional and learning resource. Garrison and Anderson (2003) argued that teaching presence brought the elements of a community of inquiry in computer conferencing together in a balanced and functional relationship congruent with the intended outcomes, and the needs and capabilities of the learners (p.29).

The CoI model identifies three key roles of teaching presence in computer conferencing with associated indicators: design and organisation, facilitating discourse, and direct instruction (Anderson et al., 2001; D. R. Garrison & Anderson, 2003). Design and organisation describes teachers' managerial roles (Coppola, Hiltz, & Rotter, 2002) such as setting curriculum, designing methods, and establishing time parameters. Facilitating discourse is extremely critical to foster and guide learner-centred approaches in online learning (Berge, 2008; Salmon, 2000; Smith, 2005), including indicators such as seeking to reach consensus/understanding, encouraging student contributions, and prompting discussion. Direct instruction reflects the teachers' function as content facilitators (Goodyear, Salmon, Spector, Steeples, & Tickner, 2001), including summarising the discussion, confirming understanding through assessment and explanatory feedback, and injecting knowledge from diverse sources.

These three roles have proved to be a valid reflection of the constituent elements of teaching presence in computer conferencing (Anderson et al., 2001; Arbaugh & Hwang, 2006; P. Shea, Sau Li, & Pickett, 2006). Studies using these roles in student surveys have substantiated that the level of teaching presence significantly affects (a) online learners' perceived learning and learning satisfaction, (b) online learning approaches, and (c) possibly interaction quality.

Teaching presence affects perceived learning. Using the three categories of teaching presence in Anderson, et al. (2001), Shea, Sau Li and Pickett (2006) observed from 1,067 questionnaire

responses that students who reported more effective instruction design, organisation, facilitation and instruction also reported higher levels of perceived learning and sense of community. Akyol and Garrison (2008) noted through a survey that students who perceived higher levels of teaching presence also perceived higher levels of perceived learning, satisfaction and cognitive presence. Shea and Bidjerano (2009) and Garrison et al. (2010) found that students who saw their instructors taking an active role in focusing online discussions also reported higher cognitive presence.

Teaching presence affects learning approaches. Garrison and Cleveland-Innes (2005) found that students with little or no instructor involvement showed either no shift or a drop in deep approaches to learning; by contrast, students with a high level of instructor engagement showed a significant shift to deep approaches to learning.

Teaching presence possibly affects the quality of online interaction. Angeli, Valandies and Bonk (2003) claimed the low level of teacher involvement in the online conferencing possibly made students primarily share personal experiences and made peer responses be too subjective at times. In a similar vein, Pawan et al. (2003) postulated that low instructor participation and the absence of overt instructor facilitation might lead to one-way interaction, low levels of cognitive phase, and a large number of off-task posts in three online forums.

However, none of the previous studies examined teaching presence via detailed analysis of computer conferencing transcripts. Mazzolini and Maddison (2003, 2007) analysed over 40,000 postings in nearly 400 discussion forums. They found that the percentage of instructor postings and instructor initiated threads significantly and negatively related to the length of discussion threads and the student posting rate. They further examined the timing of instructor postings (during or at the end of forums) and the forms of instructor postings (ie. questions and answers), but how the two characteristics of instructor postings impacted the length of threads and the student posting rate was not investigated.

The current study

Although in a much smaller scale than Mazzolini and Maddison (2003, 2007), the smaller number of postings allowed the exploration of multiple perspectives of teaching presence and contributed to research evidence in at least three ways. One, this study analysed conference transcripts to reflect how teaching presence actually occurred in online forums in terms of the number, the timing, the forms and the role of instructor postings. Two, this study examined the impact of teaching presence on the process and the quality of interaction in addition to student participation, to substantiate and expand the claims made in survey-based studies and Mazzolini and Maddison (2003, 2007). Three, this study examined knowledge construction through assimilating online messages. Insufficient research has been done to examine this aspect based on detailed analysis of discussion protocols, despite assimilating online postings being a core element of knowledge construction in computer conferencing.

Four following research questions were posed of the two investigated forums:

(1) How did the level and nature of teaching presence differ between the forums?
(2) How did teaching presence affect participation and interaction in the forums?
(3) How did teaching presence affect cognitive presence in the forums?
(4) How did teaching presence affect knowledge construction via assimilating messages in the forums?

Research context

Twenty female and six male students studying an undergraduate course at a university in Sweden participated in the study. The group included seven international students and 17 part-time students from various professional backgrounds. All were bilingual Swedish/English speakers.

The fully-internet based course focused on how linguistics could be applied in legal contexts. The study reported here was based on the first two tasks of the course that required asynchronous peer interaction in online forums (either in English or Swedish). No guidance was

given to students as for how to participate in online forums to give students more autonomy, although the students were encouraged to participate in the online forums prior to the course starting. The two tasks possessed the same exploratory nature, aiming at developing students' understanding of two textbook chapters. Each forum lasted for three weeks. The possible impact of the sequence of the two forums on instructor and student behaviours was borne in mind and discussed in the discussion section.

Methodology

Teaching presence and its impact on online learning discourse was examined via detailed analysis of conferencing transcripts from the two forums. Each message was assigned a number corresponding to its chronological sequence in each forum. The two authors of the paper performed the data analysis separately. Their coding results were then compared and a full agreement was reached thanks to the clarity and mutual exclusiveness of coding categories.

Coding process of teaching presence

Teaching presence was investigated with reference to Anderson et al.'s (2001) three categories considering their wide application and established validity. Following Anderson, et al., a message was chosen as the unit of analysis and multiple codes were allowed for a single message (ie. one message could contain more than one category). Their three categories seemed to accurately capture the functions of teaching presence in the current study.

The level of teaching presence was measured in terms of the number of instructor messages. The means of enacting teaching presence (ie. questions or statements) and whether instructor messages were followed up by students in their online postings were also examined. The impact of teaching presence on learning discourse in the two forums was investigated in terms of the process (participation and interaction) and the quality (ie. cognitive presence and knowledge development via assimilating postings) of interaction.

Coding process of participation and interaction

Participation and interaction was analysed from quantitative and qualitative perspectives. From

a quantitative perspective, participation and interaction was examined in terms of the number of student participants, student messages, peer responses, messages receiving multiple peer responses, and messages receiving no response (ie. independent statement). The analysis flowchart of turn-taking behaviours developed in an earlier study (the authors, 2013) was used to graphically depict interactional patterns via Microsoft Office Visio 2007, by following three steps:

Step 1: Who posted the message: Student messages were illustrated by circles and rectangles were used for instructor messages; different colours were used for different message contributors.

Step 2: Whether a message was followed by a response: Responses were connected to messages with arrows. Messages receiving multiple peer responses were highlighted with a bold border. Messages receiving no responses (eg. messages explaining posters' previous message) were placed in a box labelled as independent statements.

Step 3: Who made the response: Peer responses were placed in circles and teacher responses were placed in rectangles. A response from the message contributor herself/himself was excluded from the number of responses as self response did not reflect interactivity of forum discussion.

Coding process of cognitive presence

The quality of interaction was measured by applying Garrison et al.'s (2001) four phases of cognitive presence but modified as a result of our initial coding to accurately reflect the feature of discussion regarding the specific subject under research in this study (ie. forensic linguistics). In this study, *triggering events* messages identified or raised new or expanded issues based on the assigned task or ongoing discussions. *Exploration phase* messages embodied student brainstorming and summarising reading materials. *Integration phase* messages showed the use of external resources and personal experiences to justify information/opinions. The exploration and integration phases were differentiated by whether ideas were justified or otherwise. The *resolution* phase was characterised by applying linguistics knowledge to authentic legal cases.

7

Coding process of knowledge construction via assimilating peer postings

Construction of subject knowledge through assimilating postings reflected the occurrence of learning after students engaged in responding to peer messages in online forums. It was judged by two criteria: (a) messages containing viewpoints of the previous message(s) (eg. agreement), supported by justification for opinions; and/or (b) messages summarising the previous message(s), followed by viewpoints built on the summary. Disagreements between the authors were discussed until a consensus was achieved. It is worthy of noting that learners might learn from peer postings but did not post in words the justification to avoid peer criticism and probe peer postings. The current study therefore only examined uptake of peer postings that was discernible in discussion transcripts.

Results

A much higher level of teaching presence was observed in Forum 1. There, the instructors posted ten messages: the first message and nine further messages containing responses to student messages. In Forum 2, they only posted two messages in order to give more autonomy to students after they had three week experience of forum discussion in Forum 1.

All but one of the teacher messages in Forums 1 and 2 provided direct instruction, yet in different ways. In Forum 1, Message 1 (see Figure 1) presented a directing question to the group, Messages 11 and 27 injected knowledge via external resources, and seven further messages confirmed students' understanding of content through assessment and explanatory feedback with one of them also facilitating discourse by inviting learners to respond to a student message (Message 23). In Forum 2, instructor messages diagnosed misconceptions in two students' messages.

The impact of teaching presence on participation and interaction

Table 1 shows that Forum 2 contains a larger number of student messages, peer responses, and messages with multiple peer responses than Forum 1 which contains fewer independent statements. This result suggests that teaching presence might discourage student participation and peer interaction, but reduce isolated statements.

Table 1: Participation and interaction in Forums 1 and 2

	Forum 1	Forum 2
Student participant	16	16
Student message	33	36
Peer response	23	39
Messages with multiple peer response	1	4
Independent statement	2	4

The effects of teaching presence on interaction were further examined in terms of interactional patterns. Figure 1 shows instructor-centred interaction in Forum 1, consisting of three message threads. Thread 1 was initiated by an instructor and was much bigger in size than student initiated Threads 2 and 3. In Thread 1, the majority of student messages were directed towards the initial instructor message.
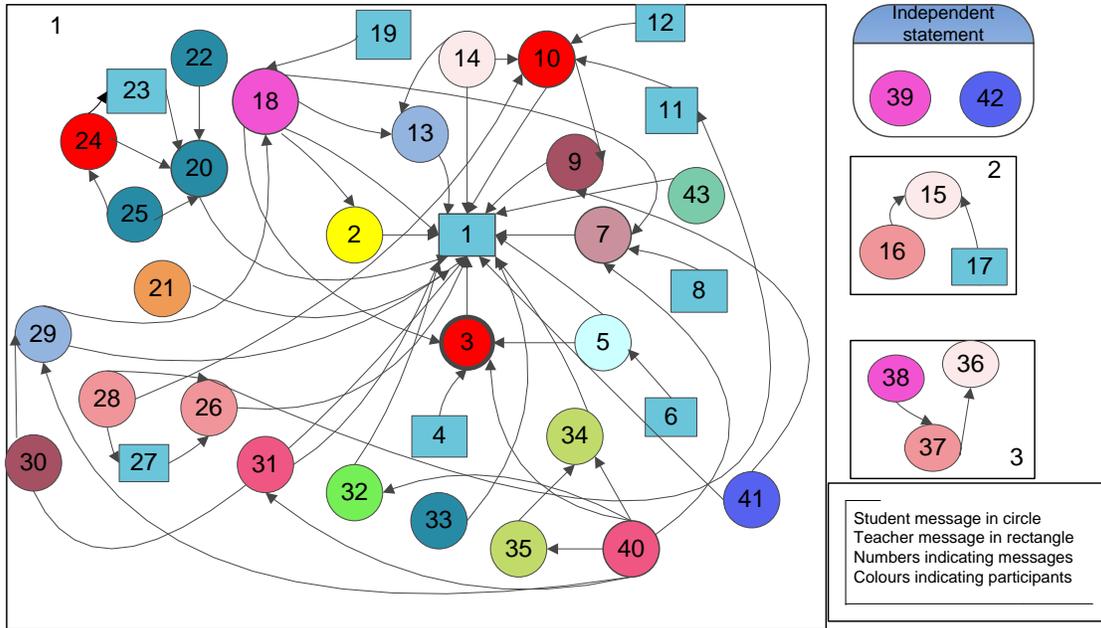
Figure 1: Interaction map of Forum 1

Figure 1 also reveals peer referencing, shown by arrows linking messages in different colours.

This was made visually clearer by removing the first instructor-initiated message (Figure 2).
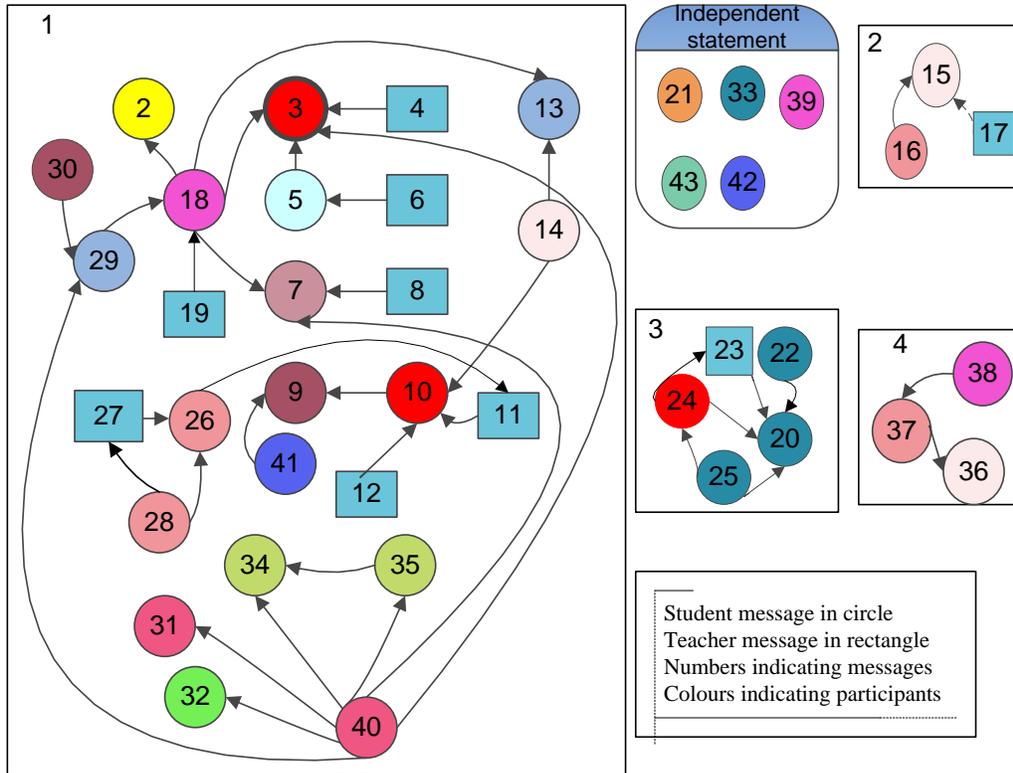
Figure 2: Interaction map of Forum 1 without the first teacher-initiated message

Figure 2 shows that peer interaction was mainly created by Message 18 which reacted to four peer messages and received one peer response, and Message 40 which responded to six peer messages. Figure 2 also substantiates how teaching presence reduced isolated statements: The removal of the first teacher-initiating message increased the number of independent statements from two to five and the number of discussion threads from three to four as it made Messages 21, 33 and 43 independent statements and Thread 4 an additional isolated cluster.

Figures 1 and 2 reveal that teaching presence in Forum 1 made the online discussions teacher-centred and peer interaction unevenly distributed, but with fewer independent statements and scattered threads.
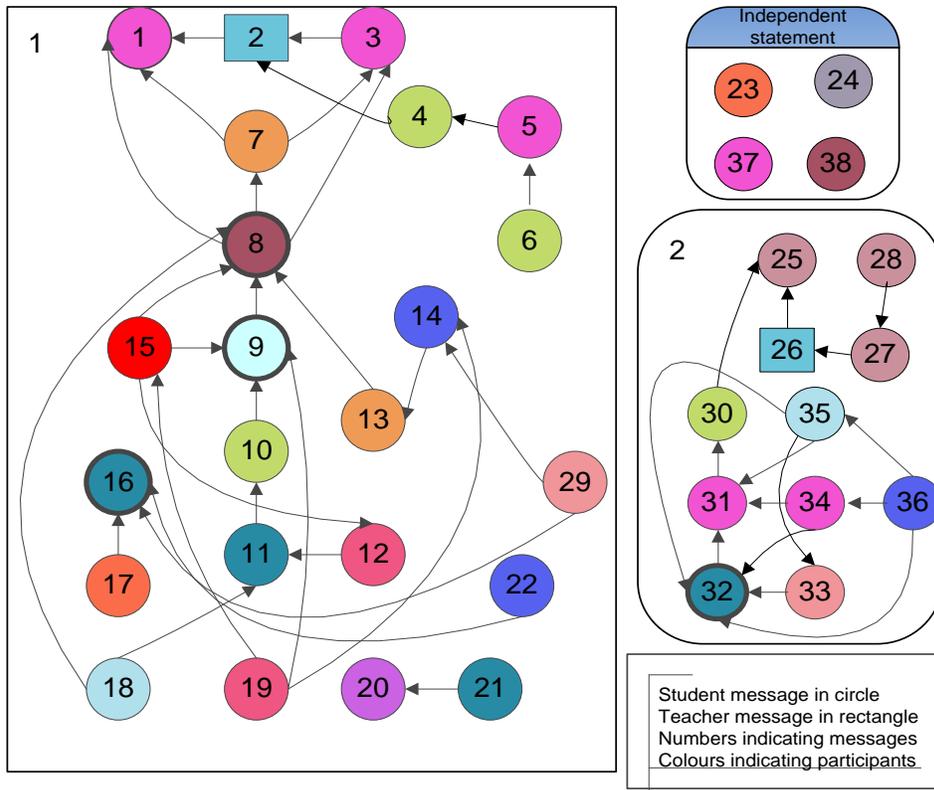
Figure 3: Interaction map of Forum 2

Figure 3 shows that Forum 2 consists of two message threads, both initiated by students. Apart from the thread that was triggered by the discussion topic assigned by instructors (Thread 1), the students raised a topic expanded upon the instructor assigned one (Thread 2). Thread 2 involved five fewer students than Thread 1 and this group of students were unable to synthesise the new information from Thread 2 into the Thread 1 discussion (thus resulting in two scattered threads). Compared with Forum 1 wherein 14 students participated in Thread 1, two in Thread 2 and three in Thread 3, the difference in the size between threads in Forum 2 was much smaller. This might suggest that student initiation made teacher assigned and student triggered topics more equally valued by students, despite of a similar nature of the two tasks attached to Forums 1 and 2.

Figure 3 also reveals a high frequency of peer referencing indicated by the density of linkages between messages in different colours. Referencing was evenly distributed among messages. The synergistic pattern of interaction in Forum 2 suggests that less teaching presence and more

student initiation might encourage peer responses and promote online peer interaction and collaboration.

The impact of teaching presence on cognitive presence

Table 2 shows that in student-initiated Forum 2, students raised seven new or expanded discussion topics (i.e. triggering events). By contrast, the high level of teaching presence in Forum 1 seemed to constrain student discussions within the instructor-initiated topic as only two triggering events were raised. Fahy (2001) viewed new and expanded discussion topics as a sign of sequential progression which provided extension or depth to the topic under discussion, corroborated by the results of cognitive phases. Despite the similar exploratory nature of the two tasks, the higher-order phases accounted for 71% of student moves in Forum 2 in contrast to 29% in Forum 1. The differences in cognitive phases in the two forums might be compounded by the sequence of the two forums (ie. the first forum initiated the forum discussion in the course and the second forum was three weeks after the first one) which might impact instructor and student behaviours.

The results might suggest that a low level teaching presence encouraged students in this study to monitor and manage their own learning that promoted self-directed higher order thinking. One possible explanation for the different cognitive phases in Forum 1-2 in relation to teaching presence is the first teacher message in Forum 1 where they posed *Olsson's chapter is ok, but I wonder if he has too broad a definition of Forensic Linguistics. I wonder if he makes too much of a case for its relevance? What do you think?*. The message seemed to set up the nature of subsequent student messages in Forum 1 and consequently, the level of cognitive presence of student postings. Subsequent student postings were of a similar structure: Students questioned whether the definition was too broad and involved too much to be relevant, followed this by quoting the book chapter, and finally explained why a broad concept of forensic linguistics was good. Hence, most messages in Forum 1 were of the type of exploration and integration. This supports the claim made in the existing studies that teacher initiation defined the discourse and the level of responses from students (Mazzolini & Maddison, 2007; Meyer, 2004). By contrast, in Forum 2, the tutors entitled the forum *Is there a linguistic fingerprint or is it an illusion* and it

13

was a student who posted the initial message. The following student postings argued whether there was a linguistic fingerprint or it was an illusion with regard to their personal experience and/or literature evidence. Hence, most messages in Forum 2 were of the type of integration and resolution.

Table 2: Cognitive presence in Forums 1 and 2

	Cognitive phases					Total
	Triggering events	Exploration	Integration	Resolution	Others	
Forum 1	2	34	21	8	35	100
Forum 2	7	18	48	36	10	119

  Note: others referred to messages unrelated to the tasks. The majority of the postings that fell into the category of *others* in Forum 1 were either about their expectation of the course outcomes or their topic of the first assignment.

The impact of teaching presence on knowledge construction via assimilating postings

A descriptive analysis showed that Forum 2 contains more cases of knowledge development via assimilating peer postings (n = 36, SD = .99) than Forum 1 (n = 14, SD = .66). A Mann-Whitney U test revealed that the difference was significant (U = 383.5, P < .05), suggesting that a lower level of teaching presence might be more conducive for knowledge construction via assimilating peer postings.

Summary and discussions

The current study indicated that a higher level of teacher presence might be associated with a lower level of participation, interaction, cognitive presence, and knowledge construction via assimilating peer messages. In particular, teacher initiation in Forum 1 seemed to shift learners'

attention from peer messages to teacher messages, which possibly made students read fewer peer postings, and thereby obtained fewer opportunities of developing subject knowledge by assimilating peer messages. In contrast, the lower level of teaching presence in Forum 2 promoted the occurrence of social presence and encouraged students to monitor their own online discussions, read and responded to peer postings, exemplified by the larger number of triggering events and peer responses in Forum 2 than in Forum 1. Consequently, students in Forum 2 achieved a higher level of cognitive presence and knowledge construction via assimilating peer messages. The findings substantiated the intertwined relationships among cognitive presence, teaching presence and social presence and their interactive influences in promoting online learning as suggested in the Community of Inquiry model (Akyol & Garrison, 2008; D. R. Garrison, 2007).

The findings go against the claims made in earlier survey-based studies which reported a higher level of teaching presence in online forums was associated with a higher level of perceived learning and learning satisfaction (eg. Akyol & Garrison, 2008; D. R. Garrison et al., 2010; P. Shea et al., 2006), deeper learning approaches (D. R. Garrison & Cleveland-Innes, 2005), and possibly higher interaction quality (Angeli et al., 2003; D. R. Garrison et al., 2010; Pawan et al., 2003). On the other hand, the current study substantiated Mazzolini and Maddison's (2007) finding that the more instructors posted messages and initiated threads, the less students participated in forum discussions. The current study has further exemplified that the type and approaches of teaching presence exert more powerful influence on the interaction quality than the level of teaching presence.

To be specific, nearly all instructor responses in Forum 1 provided direct instruction solely. However, as Nicol (2013) stipulated, an effective peer review scenario asks for dual roles for the teacher: (a) to design peer review scenarios that provoke reflective knowledge construction through providing students with opportunities to generate peer feedback and to make use of them to revise their work; and (b) to provide feedback comments that support, validate and strengthen students' ability to generate valid feedback. The first role is similar to design and

organisation and the second role is similar to facilitating discourse in Anderson, et al.'s (2001) three categories of teaching presence (i.e. design and organisation, direct instruction and facilitating discourse). In particular, Anderson et al. suggested that facilitating discourse was the most important for maintaining student interest, motivation and engagement in active online learning (p.7). In this study, only one instructor message in Forums 1 and 2 enacted this role and that message drew in two students' participation. Had instructors responded to independent statements and explicitly stated the possible linkage between discussion threads in Forum 2 as they did in Forum 1, peer collaboration in Forum 2 could have been enhanced considering teacher responses in Forum 1 reduced the number of independent statements and scattered discussion threads. The results indicated that effective teaching presence required online tutor activities to be partly managerial and directive and partly facilitative (Arbaugh & Hwang, 2006; D. R. Garrison & Cleveland-Innes, 2005; P. J. Shea, Pickett, & Pelz, 2003).

Additionally, the forms of enacting teacher responses also affected whether teacher responses were reacted to by students, and consequently, the effectiveness of teaching presence for learning in computer conferences. Questions appeared to be more effective than statements to trigger student reactions to teacher presence on the ground that teacher responses absent of student follow-ups were statements (six of the nine teacher responses in Forum 1) whereas teacher responses with student follow-ups were open-ended questions (three teacher responses in Forum 1 and the two teacher responses in Forum 2). A further analysis of cognitive presence of the student follow-ups showed that these follow-ups pushed cognitive phases from *exploration* to *integration* and *resolution*. In this sense, instructors as well as students should be reminded that in many cases the posing of probing questions can be more effective than expressing disagreements in furthering discussion and also in some settings will be much more culturally acceptable.

Implications
The current study has provided implications for online instructors.

One, the result that a higher level of teaching presence was associated with a lower level of online learning does not indicate that teaching presence is not important for online learning. The results indicate that effective teaching presence must be multifaceted to serve all the three key roles outlined by Anderson, et al. (2001) as the limited role of teaching presence in Forum 1 did not exert much impact on the learning discourse as it was expected. In addition, the comparison between the two consecutive forums is developmental and the result may also suggest that instructors should gradually reduce their presence with students gaining more experience in online forum discussions, echoing Salmon's five stage model which suggests that e-moderators are expected to be less active roles at a late learning stage when students develop their self-control and ability to learn independently (Salmon, 2011). This echoes in this study as in Forum 1 which was the first online forum for the participating students, instructor initiation and postings helped to set up example postings and responses; after three weeks of Forum 1, students became familiar with online discussions, the instructors decided to give more autonomy to students and "guide on the side (King, 1993: 30)" in Forum 2 wherein the instructors let students initiate the forum discussion and reduced responses to student messages. This seemed to encourage student participation, interaction and learning in that students posted more messages, made more responses to peer postings, and achieved a higher level of knowledge construction by reading and responding to peer postings than the students in Forum 1.

Two, different means of performing teaching presence bring about different effective levels of teaching presence: questions work better than statements to stimulate learners' response to teaching presence. This is supported by the Socratic approach that was discussed in Massolini and Maddison (2007) which believed that student knowledge and preconceptions could be developed through asking and answering of questions in asynchronous discussions. In this sense, instructors shall pose questions to stimulate further discussions on an ongoing topic via probing questions which in effect implicitly expresses disagreement and challenge with what is already threaded or start off new discussion topics via initiating questions which are often aired

by instructors or even by students later. The two distinct questions are both useful but in different ways.

Three, this study substantiates that instructor initiation of discussion threads not only discourages peer interaction but also largely affects learner knowledge construction. The results show that instructors' first postings in online forums should not set up an example response to a learning task for learners; instead, initial postings should designate a good question topic that does not set up discussion agenda but leaves space for peer discussions, as exemplified by the topic set up in Forum 2.

To sum up, the study shows that effective teaching presence asks for multifaceted functions in multiple forms and effective teaching presence needs to be graduated to estimate a minimum level of guidance (eg. to avoid setting up example responses) and be contingent to offer intervention only when it is needed and dismantles it as soon as learners show signs of self-control and ability to learn independently. Future studies should try and replicate these findings with a larger cohort of students and a larger set of computer conferencing data to minimise the possible impact of student backgrounds and the sequence of forums on the findings. For instance, the dominant female participants in the study might skew the finding as females are believed to be better at online discussion than males as females are generally thought to be more social and collaborative (D. R. Garrison et al., 2010; Guiller & Durndell, 2007; Herring, 2000; King, 2000; Thelwall, Wilkinson, & Uppal, 2010). The development of the student experience in learning to work maturely with discussion boards in the two consecutive forums might also affect the results of the study.

Three implications are offered to online learning researchers, namely: triangulating survey- and discourse-based methods, adopting multiple perspectives, and collecting learning outcomes.

One, survey-based design may help to reveal that teaching presence, cognitive presences and social presence are three interdependent elements that together engender online learning. However, this study demonstrates that discourse-based findings convey information about how

the three key elements work together in a way that influences online learning. The discrepant findings in the survey-based and discourse-based design reinforce the necessity of triangulating the two types of studies.

Two, multiple perspectives at multiple discourse levels reveal different information and thereby should be adopted in order to gain a full picture of teaching presence. For instance, examining the means of performing teaching presence and whether teaching presence is responded reveals important information about how to better provide teaching presence.

Three, the examination of knowledge construction via assimilating online messages provides another essential aspect to measure the effects of teaching presence on online learning in particular in terms of the impact of teaching presence on learners' willingness to read, respond then learn from peer postings. In addition, collection of the data of learning outcomes (eg. assignments based on discussions) and the impact of online discussion activities on that (eg. integration of peer suggestions in assignments) will reveal further information on the facilitative role of forum discussion in knowledge construction. Further studies could focus on this aspect.

Conclusions

The current study investigated teaching presence on learning in two consecutive online forums. Teaching presence in the first forum was at a much higher level than that in the second forum. The nature of teaching presence in this study led to a higher level of teaching presence associated with teacher-centred online interaction and a lower level of student participation, peer interaction and knowledge construction, whereas a lower level of teaching presence encouraged peer collaboration, stimulated student self-directed learning, and led to a higher level of cognitive phases and knowledge construction. We conclude that the nature of teaching presence and the way of enacting teaching presence is more contributory than the level of teaching presence to the effectiveness of teaching presence on learning in computer conferences.

The current study has contributed to developing the CoI model in several ways. First, the nature of teaching presence overrules the level of teaching presence in affecting online learning. Second, multifaceted teaching presence is required to achieve the potential of computer conferencing in encouraging collaborative learning. Third, the means of providing teaching presence should be another level of analysis of teaching presence. Fourth, student self regulation [i.e. the degree to which students are metacognitively, motivationally, and behaviourally active participants in their own learning process (Zimmerman, 2008)] should be considered in addition to cognitive presence, teaching presence, and social presence in examining learning community in computer conferencing because the facilitative role of teaching presence needs the involvement of and support from students. Further studies should focus on these aspects of teaching presence.

References

Akyol, Z., & Garrison, D. R. (2008). The development of a community of inquiry over time in an online course: understanding the progression and integration of social, cognitive and teaching presence. Journal of Asynchronous Learning Networks, 12(3).

Anderson, T., Rourke, L., Garrison, D. R., & Archer, W. (2001). Assessing teaching presence in a computer conferencing context. Journal of Asynchronous Learning Networks, 5(2).

Angeli, C., Valanides, N., & Bonk, C. J. (2003). Communication in a web-based conferencing system: the quality of computer-mediated interactions. British Journal of Educational Technology, 34, 31-43.

Arbaugh, J. B., Cleveland-Innes, M., Diaz, S. R., Garrison, D. R., Ice, P., Richardson, J. C., et al. (2008). Developing a community of inquiry instrument: Testing a measure of the Community of Inquiry framework using a multi-institutional sample. The Internet and Higher Education, 11(3–4), 133-136.

Arbaugh, J. B., & Hwang, A. (2006). Does "teaching presence" exist in online MBA courses? The Internet and Higher Education, 9(1), 9-21.

Arnold, N., & Ducate, L. (2006). Future foreign language teachers' social and cognitive collaboration in an online environment. Language Learning and Technology 10(1), 42-66.

Baran, E., Coreia, A.-P., & Thompson, A. (2011). Transforming online teaching presence: critical analysis of the literature on the roles and competencies of online teachers. Distance Education, 32(3), 421-439.

Berge, Z. L. (2008). Changing instructor's roles in vritual worlds. Quarterly Review of Distance Education, 9(4), 407-414.

Coppola, N., Hiltz, S., & Rotter, N. (2002). Becoming a virtual professor: Pedagogical roles and asynchronous learning networks. Journal of Management Information Systems, 18(4), 169-189.

Darabi, A. A., Sikorski, E. G., & Harvey, R. B. (2006). Validated competencies for distance teaching. Distance Education, 27(1), 105-122.

de Leng, B. A., Dolmans, D. H. J. M., Jöbsis, R., Muijtjens, A. M. M., & van der Vleuten, C. P. M. (2009). Exploration of an e-learning model to foster critical thinking on basic science concepts during work placements. Computers & Education, 53(1), 1-13.

Fahy, P. J. (2001). Addressing some common problems in transcript analysis. The International Review of Research in Open and Distance Learning, 1(2).

Garrison, D. R. (2007). Online community of enquiry review: social, cognitive, and teaching presence issues. Journal of Asynchronous Learning Networks, 11(1), 61-72.

Garrison, D. R. (2009). Communities of inquiry in online learning: Social, teaching and cogntive presence. In C. H. e. al. (Ed.), Encyclopedia of distance and online learning (2nd edition ed., pp. 352-355). Hershey, PA: IGI Global.

Garrison, D. R., & Anderson, T. (2003). E-learning in the 21st century: a framework for research and practice London: RoutledgeFalmer.

Garrison, D. R., Anderson, T., & Archer, W. (1999). Critical Inquiry in a Text-Based Environment: Computer Conferencing in Higher Education. The Internet and Higher Education, 2(2-3), 87-105.

Garrison, D. R., Anderson, T., & Archer, W. (2001). Critical thinking, cognitive presence, and computer conferencing in distance education. American Journal of Distance Education, 15(1), 7 - 23.

Garrison, D. R., & Cleveland-Innes, M. (2005). Facilitating cognitive presence in online learning: interaction is not enough. The American Journal of Distance Education, 19(3), 133-148.

Garrison, D. R., Cleveland-Innes, M., & Fung, T. S. (2010). Exploring causal relationships among teaching, cognitive and social presence: Student perceptions of the community of inquiry framework. The Internet and Higher Education, 13(2), 31-36.

Goodyear, P., Salmon, G., Spector, J., Steeples, C., & Tickner, S. (2001). Competences for online teaching: A special report. Educational Technology Research and Development, 49(1), 65-72.

Guiller, J., & Durndell, A. (2007). Students' linguistic behaviour in online discussion groups: Does gender matter? Computers in Human Behavior, 23(5), 2240-2255.

Herring, S. C. (2000). Gender differences in CMC: findings and implications [Electronic Version]. The CPSR Newsletter, 18, from http://cpsr.org/issues/womenintech/herring/ on 7th February 2013

Kim, J., Kwon, Y., & Cho, D. (2011). Investigating factors that influence social presence and learning outcomes in distance higher education. Computers & Education, 57(2), 1512-1520.

King (1993). From sage on the stage to guide on the side, College Teaching, 41(1), 30.

King, L. J. (2000). Gender issues in online communities [Electronic Version]. The CPSR Newsletter, 18, from http://cpsr.org/prevsite/publications/newsletters/issues/2000/Winter2000/king.html/ 6th Febrary 2013

Mazzolini, M., & Maddison, S. (2003). Sage, guide or ghost? The effect of instructor intervention on student participation in online discussion forums. Computers & Education, 40(3), 237-253.

Mazzolini, M., & Maddison, S. (2007). When to jump in: The role of the instructor in online discussion forums. Computers & Education, 49(2), 193-213.

Meyer, K. (2004). Evaluating online discussions: Four different frames of analysis. Journal of Asynchronous Learning Networks, 8(2), 101-114.

Murphy, E. (2004). Recognising and promoting collaboration in an online asynchronous discussion. British Journal of Educational Technology, 35(4), 421-431.

Nicol, D. (2013). Resituating feedback from the reactive to the proactive. In D. Boud & E. Molloy (Eds.), Feedback in Higher and Professional Education: Understanding it and doing it well (pp. 34-49). Oxon: Routledge.

Pawan, F., Paulus, T. M., Yalcin, S., & Chang, C.-F. (2003). Online learning: patterns of engagement and interaction among in-service teachers. Language Learning and Technology, 17(3), 119-140.

Salmon, G. (Ed.). (2000). E-moderating: the key to teaching and learning online. London: Kogan Page Limited.

Salmon, G. (Ed.). (2011). E-moderating: the key to online teaching and learning. New York Routledge.

Shea, P., & Bidjerano, T. (2009). Community of inquiry as a theoretical framework to foster "epistemic engagement" and "cognitive presence" in online education. Computers & Education, 52(3), 543-553.

Shea, P., & Bidjerano, T. (2010). Learning presence: Towards a theory of self-efficacy, self-regulation, and the development of a communities of inquiry in online and blended learning environments. Computers & Education, 55(4), 1721-1731.

Shea, P., Sau Li, C., & Pickett, A. (2006). A study of teaching presence and student sense of learning community in fully online and web-enhanced college courses. The Internet and Higher Education, 9(3), 175-190.

Shea, P. J., Pickett, A. M., & Pelz, W. E. (2003). A follow-up investigation of "teaching presence" in the SUNY Learning Network Journal of Asynchronous Learning Networks, 7(2), 61-80.

Smith, T. (2005). Fifty-one competencies for online instruction. The Journal of Educators online, 2(2), 1-18.

Swan, K. (2001). Virtual interaction: Design factors affecting student satisfaction and perceived learning in asynchronous online courses. Distance Education, 22(2), 306-331.

the authors. (2013). British Journal of Educational Technology, n/a-n/a.

Thelwall, M., Wilkinson, D., & Uppal, S. (2010). Data mining emotion in social network communication: Gender differences in MySpace. Journal of the American Society for Information Science and Technology, 61(1), 190-199.

Zimmerman, B. J. (2008). Investigating Self-Regulation and Motivation: Historical Background, Methodological Developments, and Future Prospects. American Educational Research Journal, 45(1), 166-183.