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Community of Inquiry as an instructional approach: What effects of teaching, social and cognitive presences are there in blended synchronous learning and teaching?

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ABSTRACT

Little research has been conducted to integrate teaching, social and cognitive presences as three instructional components of an instructional approach to contextualizing blended synchronous learning and teaching experiences. This qualitative case study reports the use of a community of inquiry instructional approach to exploring the effects of the presences on shaping the experiences of online and face-to-face students and their instructor. The students and instructor interviews, video recordings and class observations over an entire engineering drawing course were collected for data analysis with the use of a coding scheme derived from the presences. The findings revealed that attainment of the intended learning outcomes relied more on the teaching presence than on the social and cognitive presences of the approach. The instructor's performance could bring about a leadership role of teaching presence as being more important than the social and cognitive presences in the engineering course. However, the instructional effects of the teaching, social and cognitive presences contributing to the blended synchronous learning and teaching mode were situational and context specific. Implications for further research are discussed.

1. Introduction

The concept of university learning and teaching supported by information and communication technology (ICT) is not new in higher education. It has been implemented for innovative educational opportunities beyond conventional instructional approaches (López-Pérez, Pérez-López, & Rodríguez-Ariza, 2011; Picciano, Dziuban, & Alfred, 2007; Szeto, 2011, 2013). Challenges to researchers are to find ways through which students and instructors' experiences can be shaped in different forms of online, face-to-face or blended learning mediated by ICT. Such experiences are imperative to developing an effective instructional approach to the learning modes.

The Community of Inquiry framework (Garrison, Anderson, & Archer, 2000) has been widely adopted in studies of asynchronous blended and online learning (e.g., Akyol & Garrison, 2011; Shea, Li, & Pickett, 2006). This study further explored the framework as an instructional approach to shaping blended synchronous learning and teaching experiences. As there have been various forms of the blended mode (Hastie, Hung, Chen, & Kinshuk, 2010; López-Pérez et al., 2011; Partridge, Ponting, & McCay, 2011; Szeto & Cheng, 2014), the study needed to identify an appropriate blended mode for the exploration. The instructional approach derived from the framework involved using video-conferencing for online and face-to-face students' learning in a synchronous blend of virtual and face-to-face situations.

This paper focuses on exploring the experiences in blended synchronous learning and teaching processes over an entire blended synchronous course. Specifically, it seeks to address three research questions:

1 How is the CoI framework implemented as an instructional approach to blended synchronous learning and teaching?
2 What instructional roles of the teaching, social and cognitive presences emerge in the process of the blended synchronous mode?
3 What instructional effects do the three presences have on the instructor's and students' experiences?

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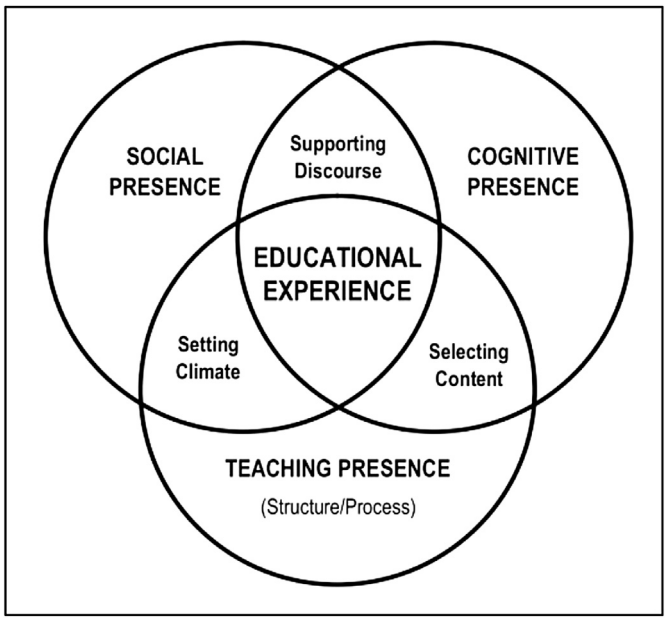

Fig. 1. The Community of Inquiry framework. Source: Garrison et al. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *Internet and Higher Education*, 2(2–3): 87–105.

2. CoI framework

Focussing on educational experiences, the CoI framework (Garrison et al., 2000) has been developed in online modalities ranging from text-based, asynchronous computer-mediated communication (CMC) and computer conferencing to student online learning satisfaction (Garrison, Anderson, & Archer, 2010). The quality of the educational experience is conceptualised at the intersecting centre of the teaching, social and cognitive presences of the CoI framework. The focus is on the attainment of deeper levels of meaningful learning through constructivist-oriented instruction (Akyol et al., 2009; Akyol & Garrison, 2011). The three presences are important conceptual elements in a CoI, with each only representing a facet of the educational experience. Fig. 1 presents the CoI framework.

The teaching, social and cognitive presences are assumed to play equal roles in shaping deeper levels of learning, as 'cognitive processes and outcomes are at the core of the transactions. Social presence and even teaching presence are, in most respects, facilitators of the learning process' (Garrison & Anderson, 2003, p. 55). Social presence is regarded as 'the ability of participants [students] in a community of inquiry to project themselves socially and emotionally, as "real" people through the medium of communication being used' (p. 94). Cognitive presence is defined as 'participants [students] in any particular configuration of a community of inquiry [being] able to construct meaning through sustained communication' (Garrison et al., 2000, p. 89). It also 'provides a description of the progressive phases of practical inquiry leading to resolution of a problem or dilemma' (Akyol & Garrison, 2011, p. 235).

Some studies (e.g., Garrison, Cleveland-Innes, & Fung, 2010), however, have indicated that the three presences do not play equal roles. Teaching presence, for example, facilitates student learning through course components. It has been interpreted as effective instructional leadership during the learning processes (Akyol & Garrison, 2011; Garrison, 2007) that takes a constructivist orientation. Teaching presence plays a lead role in facilitating social presence for communicative interactions and fostering student learning to achieve the intended learning outcomes. In contrast, Kozan and Richardson (2014) claimed that cognitive presence may have significant impact on its relationship with social presence and teaching presence whereby cognitive presence seems to play a dominant role among the three presences. Regardless of the different views, the three presences are all necessary components in the shaping of educational experience (Garrison, 2011).

Researchers (Garrison, 2011; Garrison & Anderson, 2003) have further developed sub-items of the three presences as a coding scheme to understand online educational experiences. Subsequently, the scheme is used as a predefined code book for analysing discussion transcripts. A substantial number of studies (e.g., Carlon et al., 2012) have also been conducted that adapt the scheme to measure the effects of online learning on cognitive outcomes and student satisfaction. Table 1 shows the sub-items for the teaching, social and cognitive presences.

In contrast, little research has been conducted to operationalise the CoI framework as an instructional approach for designing courses to be conducted in an online learning context. Garrison (2011) repeated the preliminary guidelines and recommendations for translating the

Table 1
The teaching, social and cognitive presence sub-items.

Teaching presence	Social presence	Cognitive presence
Instructional management	Emotional expression	Triggering events
Building understanding	Open communication	Exploration
Direct instruction	Group cohesion	Integration
		Resolution

framework to practical instruction with teaching, social and cognitive presences in blended learning (see Table 1). This study further applied the CoI framework as an instructional approach to blended synchronous learning and teaching instead of protocol analysis of asynchronous discussions (e.g., Zydney, de Noyelles, & Seo, 2012). The approach was to shape educational experience in alignment with the coding scheme (Garrison & Anderson, 2003) of teaching, social and cognitive presences. Instructional effects of the presences of the CoI approach are elaborated in the following case study of blended synchronous learning and teaching.

3. Case study

Drawing from an on-going project, the objective is to investigate changing instructional approaches for various forms of learning. The project has examined face-to-face, asynchronous/synchronous online and blended learning modes (e.g., Szeto & Cheng, 2014) in the advent of ICT. It has involved first-year undergraduate students in different phases of investigation in Hong Kong higher education institutions. This paper reports the study conducted in one of the phase, which was a case study (Creswell, 2012; Yin, 2003) on extending the CoI framework as an instructional approach in a blended synchronous learning mode. The study focused on exploring instructional effects of the teaching, social and cognitive presences of the framework, as a whole, on blended synchronous learning and teaching experiences in a Hong Kong university. The study intended to provide research-based findings to inform course instructional approaches to enriched educational experiences of students and instructors as a whole. Thus, it is of interest to programme developer, online teachers or instructional designers in Hong Kong and those in other places.

3.1. The blended synchronous mode of learning and teaching

There are many ways to design blended learning, be it asynchronous or synchronous, mediated by ICT (e.g., Hastie et al., 2010; Picciano et al., 2007; Szeto, 2014). The study was set in a blended learning mode that synchronously blended online learning and face-to-face teaching with the use of videoconference. This type of blended synchronous learning and teaching has become ubiquitous and has gained much currency in higher education (Hastie et al., 2010; Smyth, 2011; Yamada, 2009). These ways of blended learning involved synchronous online discussion among different groups of online students or a new instructional model mediated by videos. Indeed, the mode of instructional communication has been extended beyond the earlier stages of text-based computer conferencing (e.g., Bullen, 2007; De Wever, Schellens, Valcke, & Van Keer, 2006).

Among these ways of blended learning and teaching, the holistic model of Hastie et al. (2010) contends that in ideal blended synchronous mode, teachers and students 'are participating both in physical classrooms and in cyber classrooms' (p. 17). The ideal was different from the others' in the way through which teachers and both online and face-to-face groups of students were synchronously participating in learning and teaching. If this model can be extended, there will be more than one teacher teaching various groups of online and face-to-face students, while they are linked videoconference on the Internet.

In the study reported in this paper, the project team adopted Hastie et al.'s (2010) holistic mode of blended learning (Mode 9). This mode involved not only the instructor who taught the theory and performed hands-on demonstrations, but also the first-year engineering students who were divided into online and face-to-face groups of students participating in the learning activities. Participation of the instructor and the two groups of students shaped the learning and teaching processes in blended synchronicity (Szeto & Cheng, 2014). The technological infrastructure for this blended synchronous mode was consisted of regular computer and network facilities with desktop video conferencing devices available in general university teaching venues. Portable computers, video and real-object projectors were available without particular technical reconfiguration. However, the video and audio qualities were kept in an acceptable level for the blended synchronous learning and teaching, to avoid transmission delay. Videoconference was the key component to mediate the blended synchronous environment for the participants. Then, the case study could focus on investigating any effects of the CoI presences as three interrelated instructional components on the blended synchronous learning and teaching experiences.

3.2. The course participants

A project team was formed with two faculty members from an engineering department of a multi-campus university and the author, who was from another institution in Hong Kong. The team chose a computer-aided engineering drawing course for the case study. One of the two faculty members (the instructor) was responsible for translating and implementing the CoI framework as an instructional approach to blended synchronous mode of learning and teaching. This approach will be elaborated in the next section.

Twenty-eight first-year engineering students ($n = 28$) agreed to participate in the study. To obtain informed consent, the aims, research design and processes of the study were explained to the students. They then enrolled in the engineering drawing course. Half of the students were randomly assigned to the online group, and the other half were in the face-to-face group. The online group ($n = 14$) synchronously attended the same sessions at a remote site while the instructor taught the face-to-face group ($n = 14$) in an engineering laboratory. The sample size was deemed appropriate for this case study, as it aimed to illuminate the particular students' and instructor's experiences in this context of blended synchronous learning rather than attempting generalisation.

3.3. CoI framework as an instructional approach

Researchers (e.g., Rubin, Fernandes, & Avgerinou, 2013; Shea et al., 2012; Swan, Matthews, Bogle, Boles, & Day, 2012) have adopted different approaches to implementing the CoI framework in higher education. In contrast, the author of this study developed the framework an instructional approach that aligned with educational experience through the coding scheme of teaching, social and cognitive presences, on the assumption that the three presences are interrelated instructional components (Garrison, 2011). In the notion of Biggs and Tang's (2007) constructive alignment, the educational experience was expected to be aligned with instructional effects of the approach on student learning. However, the author also examined how the instructor's teaching was affected in the blended synchronous mode.

In this study, the CoI instructional approach is comprised of three instructional components derived from the teaching, social and cognitive presences with an emphasis on learning activities. These components were postulated to guide the content to be presented or demonstrated, direct the establishment of the peer communication atmosphere and inform the discourse that would facilitate students' participation in the blended synchronous mode (Szeto, 2013). The three components were first adapted to guide how the course was designed in alignment with the intended learning outcomes (Biggs & Tang, 2007) that shaped the educational experience of the intended instructional effects of the three CoI presences. Their experiences would be examined in the specific online contexts by using the coding scheme derived from the same set of presence sub-items (Garrison, 2011; Garrison & Anderson, 2003). Again, the scheme (Table 1) was used as a code book for a direct coding of the instructional effects (Tables 5–7). Table 2 shows the intended instructional effects of the three presence components.

3.3.1. The intended instructional effects of the three presence components

According to the early conceptualisation (Garrison et al., 2000), teaching, social and cognitive presences of the framework could play an equal role in shaping educational experience in processes of online learning. Garrison and Arbaugh (2007) indicated that a potential issue of the three presences in the processes. They asserted that a salient role of the teaching presence emerged to drive the other two presences in the CoI framework. It was likely that the teaching presence component might emphasise the instructor's role as an instructional expert who facilitates the social and cognitive presences throughout the process of online learning and teaching (Kupczynski, Ice, Wiesenmayer, & McCluskey, 2010). By basing on findings of subsequent studies, Garrison (2011) further argued that this instructional role is necessary for higher-order learning. Despite of the prominent role teaching presence might play, this study expected that instructional effects of the three components could contribute to attainment of the learning outcomes in a balanced, interrelated the blended synchronous learning and teaching process. Each presence is responsible for a specific instructional aim involving various types of learning activities with intended instructional effects (see Table 2).

In this case study, for example, the teaching presence instructional component adapted a mix of direct and constructivist instructional strategies to simultaneously teach the online and face-to-face students in the blended synchronous mode. The social presence instructional component involved constructing student interactions by facilitating peer online/face-to-face communication and support while the students participated in the learning activities. The cognitive presence instructional component calls for a strategy of formative assessment for learning in which students must complete individual course work, group projects, a quiz and participate in open and group discussion activities.

The intersecting areas between two presence components represent intended instructional effects of the three components which shape educational experiences as the CoI framework conceptualises. At the intersection of the teaching and cognitive components, the selected content is the instructor's presentation and demonstration of engineering drawing knowledge and skills. The instructor's immediate

Table 2
The intended instructional effects of the three presence components.

Instructional component	Instructional method	Intended instructional effect
Teaching presence	A mix of direct and constructivist instruction to facilitate and enhance the face-to-face and online student learning in the blended synchronous learning mode.	Provide the student an initial understanding of the knowledge, and then build their capacity of structuring the knowledge and deepening the initial understandings. Exercise a form of instructional or educational leadership that can lead to effective and meaningful bended learning.
Teaching/social presence intersection	Provide immediate feedback; post timely questions for the face-to-face and online students; share finished learning artefacts between the two groups of students.	Establish an appropriate social climate for in-group and cross-group communication that contributes to cultivating learning experience in a blended social atmosphere.
Social presence	Construction of learning through peer participation, interaction and support in a blended synchronous communication.	Facilitate participation, collaboration, peer evaluation and peer reflection that contributes to forming a blended community of learning and teaching experiences.
Social/cognitive presence intersection	Facilitate learning activities; moderate open and group discussions and discourses; reflect on the discussed content.	Support in-group and cross-group discussions and discourses that enrich individual and collective learning relationships and contribute to constructive educational experiences.
Cognitive presence	Attainment of the intended learning outcomes through quizzes, presentation of individual exercises, peer evaluation of group projects and peer feedback on discussions aimed at deeper levels of learning.	Construct a formative assessment scheme for peer-supported learning that enhances both the student learning and instructor teaching experiences.
Teaching/cognitive presence intersection	Present content knowledge; explain theories; demonstrate skills; and link content knowledge with learning activities.	Select appropriate content knowledge for the students with various levels of teaching that shape and consolidate student' initial understandings and instructor's blended instruction.

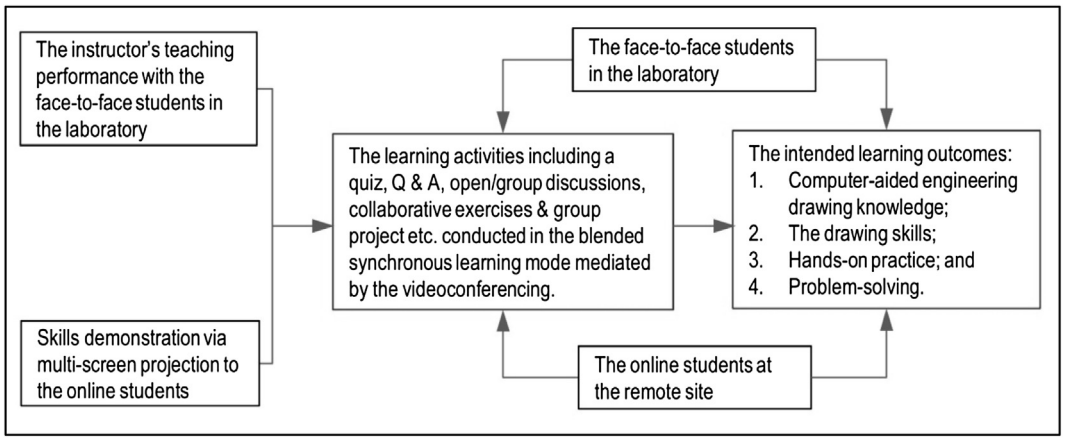

Fig. 2. The learning activities incorporated in the learning process.

feedback to the students' questions and the sharing of the students' drawings to promote discussion established a social climate for interactive communication at the intersection of the teaching and social components. Supporting the acquisition of knowledge and skills through learning discourse refers to the facilitation of student participation in the learning activities at the intersection of social and cognitive components. It is expected that the instructional effects as a whole bring about deeper levels of learning and teaching.

3.3.2. The learning activities

In this study, the core of the CoI instructional approach was the learning activities designed in accordance with the teaching, social and cognitive instructional components. The instructor engaged the online and face-to-face students in the learning activities during the blended synchronous teaching and learning processes. Fig. 2 shows the learning activities incorporated in the learning processes.

The course required the students to attend 6 h of classes per day over nine days for a total of 54 h, submit seven individual engineering drawing assignments and take an in-class test in the fifth session. As part of the formative assessment of the students' engineering drawing learning, some learning activities were conducted in the engineering laboratory and at the remote learning site in a face-to-face on-site mode. Others were delivered in the virtual learning environment mediated by the videoconferencing in a blended synchronous online mode. These face-to-face and blended synchronous online activities required individual and collaborative learning including the instructor/student initiated question-and-answer sessions, live demonstrations of engineering drawing, in-class self-study sessions, open discussion and sharing, cross-/group discussions, feedback and critiques, in-class individual/group practice of engineering drawing, individual/group engineering problem-solving exercises, and group projects/presentations/reports. Table 3 summarises the learning activities.

3.4. Data collection and analysis

The qualitative methods deployed to collect data throughout the engineering course included teaching reflection, class observation, video recording, semi-structured interviews and end-of-course group sharing. Multiple sources of qualitative data were generated, including observational notes, 4-in-1 synchronised videos of 10 half-day instructional sessions, 21 interview transcripts and a transcript of the focus group sharing. By analysing the data, further understanding of the experiences and potential pedagogic opportunities of the CoI

Table 3
A summary of the learning activities.

	Individual learning	Collaborative learning
A face-to-face on-site mode	- in-class self-study sessions for preparation of the engineering exercises - in-class individual practices of engineering drawing - individual engineering problem-solving exercises - Open sharing and discussions of some common drawing challenges - An in-class engineering drawing test	- Group discussions of related engineering drawing topics - Group practice of engineering drawing - Group engineering problem-solving exercises - Group discussions, feedback and critiques of the students' engineering solutions
A blended synchronous online mode	- Instructor/student initiated question-and-answer sessions for all the students from the face-to-face and online groups - Learning through the instructor's live demonstrations of engineering drawing mainly for the online student group	- Cross-group discussions of some common drawing challenges - Cross-group problem-solving exercises - Cross-group sharing, feedback and critiques of the students' engineering solutions - Cross-group projects/presentations/reports

Table 4
Sample coding of the data.

Coding scheme		Sample quotes
Teaching presence	- Instructional management - Building understanding - Direct instruction	- Realisation of the pedagogical difference between the blended synchronous learning and teaching modes (the instructor's extract). - I paid attention to our learning during the session (an online student's extract).
Social presence	- Emotional expression - Open communication - Group cohesion	- I pushed so hard to facilitate inter-group communication between the two groups of students (the instructor's extract). - We needed to share a microphone in inter-group communication (a face-to-face student's extract).
Cognitive presence	- Triggering events - Exploration - Integration - Resolution	- Multi-screen presentation supported detailed explanation of the topics and demonstration of the drawing skills (a face-to-face student's extract). - The assignment and quiz results did not show remarkable difference between the two groups (the instructor's extract).

framework was obtained. Due to the richness of the multiple data sources, the team examined the experiences using the coding scheme as an initial code book for teaching, social and cognitive presences (see Table 1) as an initial coding structure. In this way, the analysis could be coherently aligned with the CoI instructional approach while remaining flexible enough to allow for any emerging themes that supplemented the understanding.

A computer-aided qualitative data analysis package, NVivo 9, was used to code the relevant data extracts as instances of student experiences. As human actions are based on social meanings, such as beliefs and intentions, what constitutes a real claim for one person may not be real to another, depending on interpretation (Bassey, 1990). Thus, to enhance the internal validity, the final coding of the researchers was compared within NVivo. The inter-rater reliability Cohen's Kappa coefficient (Cohen, 1960) was calculated to be 0.88, which indicates substantial agreement between researchers. Any disagreements were resolved through discussion until a consensus was reached. Table 4 presents the sample coding of the data.

3.5. *Effects of teaching, social and cognitive presence instructional components on the educational experiences*

The CoI instructional approach was applied throughout the entire engineering drawing course. The online/face-to-face student learning experiences and the instructor's teaching experiences were contextualised in the learning and teaching process. Video was one of the multiple data sources, which recorded the process in a 4-in-1 format. Fig. 3 illustrates a 4-in-1 video snapshot of implementing the CoI instructional approach during the course.

Tables 5–7 highlight the key experiences of the teaching, social and cognitive presence components as determined by analysing the video and the interview and field note data with the coding scheme. Each table shows experiences abstracted from a thorough process of constant comparison to represent the meanings of the experience shaped by the instructional components. The key experiences characterise the instructional effects from the perspectives of the online students, face-to-face students and the instructor. Each table summarises the perspectives to represent the instructional effects of the individual instructional components.

3.5.1. *Key experience highlighted in the teaching presence instructional component*

Table 5 shows that the two groups and the instructor experienced a sense of engagement in the instructional experiment. Additional attention was given to the online group, while the face-to-face group was perceived as a control group. Clarity in conveying the content to

Fig. 3. A 4-in-1 video snapshot of implementing the CoI instructional approach in the course.

Table 5
The key experiences highlighted in the teaching presence instructional component.

Teaching presence	Online students	Face-to-face students	The instructor
Instructional management	- The teaching strategy seemed better than face-to-face. - Teaching was very comprehensive.	- This was extraordinary compared with normal class teaching.	- Different attention was paid to the online students so that the face-to-face students seemed to be a 'control group' in an experiment.
Building understanding	- Deliberately-repeated steps for skills demonstration enhanced clarity.	- The topic was exceptionally clear, but overdone repetition might make the teaching a bit unnatural.	- Repetition was more important to the online students. - The online students could fully grasp the content while the face-to-face students did not feel bored due to the steady pace.
Direct instruction	- Demonstration was really good because the skill processes were enlarged on a big screen.	- The presentation was very detailed and at a steady/slow pace.	- With a mix of direct and constructivist instruction, I experienced the pedagogical difference and challenges.

the online students was praised in terms of being 'detailed', having a 'steady teaching pace' and 'enhanced clarity', in contrast to the face-to-face students' comments that the instruction involved 'overdone repetition'.

Although the instructor unintentionally offered different levels of attention to the two groups, both the online and the face-to-face students complimented the instruction for being 'comprehensive' and 'extraordinary', respectively. The different levels of support for the online group, the instructor recalled, might be driven by his feeling that the online students were always at a distance from his teaching. Perhaps, this was his pedagogic response to the situation to "supplement the students' learning". In so doing, this extra effort turned into an instructional effect of clear and detailed blended synchronous teaching at an appropriate pace that strengthened the teaching presence in the virtual learning environment.

The enhanced teaching presence also stimulated instructor-student and student–student interactions through moderation of the learning activities in the virtual environment. For example, the instructor moderated timely problem-solving exercises for the two groups of students and linked their solutions across the two groups for further peer feedback and discussion (Tables 3 and 4). The moderation emphasised student–student interactions between the two groups during the problem-solving processes. One online student further added a general evaluation of the learning experience:

> I felt free and liked the feeling very much. The interactive methods [such as problem-solving exercises/discussions and inter-group projects] seemed interesting and better than traditional face-to-face teaching. I was eager to learn in such an atmosphere.
>
> Focus Group Interview Extract/S1.

However, some of the online students felt that they were subjected to greater scrutiny while the face-to-face students felt neglected because the instructor spent more time presenting the engineering knowledge and demonstrating the skills to the online group.

The instructor reflected that the 'instructional experiment' with the two groups was 'enjoyable'. The mixed instructional strategies transformed his performance to encompass the multiple roles of presenter, facilitator, moderator and coordinator by incorporating direct and constructivist instruction during the course. The shift was an instructional challenge that required sound instructional leadership to walk through the blended synchronous learning process with both the online and the face-to-face students. In this way, the online learning and face-to-face teaching experiences were synchronously interwoven.

Table 6
The key experience highlighted in the social presence instructional component.

Social presence	Online students	Face-to-face students	The instructor
Emotional expression	- We can feel a "real" sense of attending 'face-to-face' teaching but the contact with the face-to-face students was short and brief.	- The tutor spent longer facilitating the online students in the Q&A sessions. - Interested in meeting other students located at the remote site	- Adjusted my language use, facial expressions and other social cues to enhance expressions directly and explicitly.
Open communication	- Experienced short transactional interactions with the face-to-face students for cross-group activities.	- Interaction with the online students was difficult because the students were not physically present.	- Used hand gestures for the online group to facilitate their responses, while repeatedly probing the face-to-face group for inter-group communication.
Group cohesion	- Collaborative activities with the face-to-face students were indirect in the environment.	- Multi-screen projection of the online students enhanced a sense of connected learning communities at large.	- Pushed so hard to facilitate the two groups' participation.

Table 7
The key experiences highlighted in the cognitive presence instructional component.

Cognitive presence	Online students	Face-to-face students	The instructor
Triggering events	- Lacked live practice of the knowledge learned together with the instructor.	- Responses to the instructor's or the online students' questions could encourage knowledge sharing.	- The students were spontaneous when engaging in group learning activities.
Exploration	- Satisfactory learning together with the other group was facilitated in the close to 'real face-to-face' environment.	- Attained the expected learning outcomes with diverse activities for exploration with the online students	- Additional stimulation of group communicative interactions was required.
Integration	- Assignments could be completed more easily.	- Engineering knowledge and computer-aided drawing skills were gained in these activities.	- The assignment and quiz results did not show remarkable difference between the two groups.
Resolution	- Engineering knowledge and drawing skills became familiar more quickly.	- Solving the drawing problems seems challenging in the blended synchronous learning mode	- The two groups might be disengaged in learning sometimes.

> I taught in a traditional face-to-face classroom before this blended synchronous learning mode. With the new instructional approach, my instructional strategy was transformed and became much more interactive as I synchronously guided and facilitated the online and face-to-face students.
>
> Extract from instructor's reflection.

The instructor gained new experience in a blended synchronous instructional context expanded beyond that in either a pure online or face-to-face teaching mode. He realised that he performed as an instructional leader similar to the role as Akyol and Garrison (2011) described. Such leading role seemed to be salient in designing and implementing the blended synchronous mode to enrich the learning experience of the online and face-to-face students. In addition, the instructor needed to manage the learning pace between the two groups and facilitated their inter-group interactions, thus allowing the students to self-regulate their learning as they worked to attain the intended outcomes.

3.5.2. Key experience highlighted in the social presence instructional component

Table 6 displays the students' and the instructor's key experiences in terms of the social presence items. Facial and verbal communicative interactions were the main aspects that emerged as the participants engaged in online discussions, inter-group problem-solving exercises and group projects that constituted part of the formative assessment. The challenge for both the online and face-to-face students and the instructor was to achieve a sense of closeness with respect to face-to-face contact in the blended synchronous environment. Their experiences reflect that the senses of 'indirectness' and 'unnaturalness' are inevitable in this context. One face-to-face student commented that:

> We were not used to discussing or doing things with others through a screen and a microphone with a voice level louder than normal talking.
>
> Focus Group Interview Extract/S3.

Both the students and the instructor tried to overcome this challenging experience by enhancing their visual and auditory cues when interacting with each other. Due to the absence of real face-to-face interactions, the two groups unconsciously enhanced their contact with hand gestures and language tone in the blended context. The instructor facilitated the online inter-group communication with explicit and repeated instructional cues. With the combined efforts of the students and the instructor, both the online and face-to-face groups appreciated the multi-screen projection effect, which helped them to improve the sense of closeness in a pseudo face-to-face atmosphere. Some online and face-to-face students mentioned that 'being synchronously connected with the online group enriched our face-to-face learning and vice versa'. Nonetheless, their open and inter-group discussions were short and transactional. The online and face-to-face students' positive and challenging learning experiences in the blended synchronous mode is worthy of further research in different groups of students.

3.5.3. Key experience highlighted in the cognitive presence instructional component

In terms of the experiences in the cognitive presence, both the online and face-to-face students stated that they learned the engineering knowledge and skills quickly and easily through the assessment tasks. Although the inter-group interactions in the learning activities were not as smooth as those of the online students or as smooth as the instructor expected, the face-to-face students agreed that discussions with the online students and the instructor did encourage knowledge sharing. It is understandable that the experiences mentioned by the above students were specific in the context of the study. Perhaps, cognitive presence instructional component need further in-depth study that might be out of the scope of the study. Table 7 shows the key experiences highlighted in the cognitive presence.

Table 7 displays the online and face-to-face students' experiences in attaining the intended learning outcomes. The formative assessment of student learning was based on inter-group exercises, open/inter-group discussions, group projects and the results of a quiz administered during the fifth session. All of these were deployed to help the students to attain the learning outcomes. However, the instructor observed that sometimes the two groups did not actively participate in the learning activities. Accordingly, he devoted more time to promoting

discussion between them in the problem-solving exercises in the blended synchronous learning environment. Additional efforts were also required to foster inter-group interactions to attain the intended learning outcomes. Nevertheless, knowledge exchanges and sharing among the face-to-face students were much more explicit than those among the online students.

Interestingly, the two groups of student participants of the study experienced a similar attainment of the intended learning outcomes, with similar results for the quiz and the formative assessment. For example, the online and face-to-face groups' average quiz results were 65% and 58.85%, respectively. Although the former group's average score was slightly higher than that of the latter, the instructor did not find any notable difference between the two groups in the overall assessment.

4. Discussion

This case study applies the CoI framework as an instructional approach in the context of blended synchronous learning and teaching. The results answer the research questions, as the CoI instructional approach was designed so that the examination of educational experiences aligned with the teaching, social and cognitive presences. Although other researchers have adopted different ways of examining the framework (e.g., Kozan & Richardson, 2014; Swan et al., 2012), this study proposed the alignment within the CoI construct for the study of the blended synchronous mode. The merit takes into account of the notion of constructive alignment (Biggs & Tang, 2007) from the beginning of instructional design in accordance with the three instructional components to the understandings of the participants' educational experiences with the coding scheme of the presences (Akyol & Garrison, 2008).

Interestingly, the results reflect the constructive coherence of shaping the experiences by the uneven instructional effects and roles of the three presences, instead of equal contribution, in the blended synchronous mode. Course instructors and developers should take into consideration such influences of the presences when operationalising the framework as an instructional approach. Perhaps, these are the emergent issues which may facilitate or hinder deeper levels of meaningful learning (Akyol et al., 2009; Akyol & Garrison, 2011) in this context that warrant further discussion.

First, the results unveil that the teaching presence effect is prominent and overshadows the social and cognitive presences in the context of the study. They confirm other researchers' studies (e.g., Akyol & Garrison, 2008; Shea et al., 2006) that teaching presence played an important role in the three presences of the CoI framework. The instructional effects of the teaching, social and cognitive presences in the engineering drawing course designed for blended synchronous mode in the CoI framework is similar to Garrison et al.'s (2010) study of the relationships among the three presences. In contrast, Kozan and Richardson (2014) claimed that the cognitive presence effect was the prominent one among the three in their study. Despite the different results, course instructors and developers can flexibly build in more interactive learning activities, enhance online/face-to-face instruction or inspire students' inquiry to even out the effects of the three presences.

The results also reflect that the instructional roles of the presences are not balanced in learning and teaching process of the course. They echo Garrison's (2011) assertion in his book on e-learning that teaching presence played a leadership role of facilitating and managing the effects of the social and cognitive presences. Perhaps, the nature of a course affects the state of balance of the instructional roles. For example, a course in education, if not the engineering drawing course, may lend itself more to the social and/or cognitive than to the teaching presence. Although the results are affirmed with the above coherent understandings of the instructional approach, the prominent instructional role of the teaching presence in relation to online teachers' performance seems to be course specific. This requires further research.

Second, as the experiences reflect in the study, the instructor simultaneously performed multiple roles as a content presenter/demonstrator, a facilitator and a moderator of the three intersecting areas (see Tables 2 and 5) while leading the instruction. In particular, the instructor adopted a mixed strategy of direct and constructivist instruction throughout the course which seemed to lead the online and face-to-face groups to attain similar results in the assessment. The multiple roles could provide different senses of student learning when the online and face-to-face students participated in the learning activities built in the instructional approach as a form of formative assessment. While enriching the teaching presence with the multiple roles, the social and cognitive presences became less accessible to or played a supportive role for the students. The teaching presence instructional component of the CoI approach seems to rely on the instructor's performance as multi-role leadership in blended synchronous learning and teaching. However, this requires further elicitation.

Given the multi-role leadership mentioned in the above discussion, Akyol and Garrison (2011) incidentally asserted that teaching presence incorporates the important role of instructional leadership in revisiting the CoI framework. However, they did not further elaborate what this role means for the CoI framework in online learning. Is that leadership role associated with a meaning of direct instruction for online learning as that in traditional face-to-face teaching? Does it mean a new form of e-leadership (e.g., Gurr, 2004) emerged in online/blended learning modes? This leaves room for further discussion.

Third, the study argues for a form of e-leadership emerged in the CoI instructional approach to the blended synchronous learning and teaching. Given that an instructor teaches in an online/blended environment, s/he is primarily a teacher teaching in a classroom setting. Anderson (2008) contextualised that an online teacher is an e-teacher. He perceived that:

> …an excellent e-teacher is an excellent teacher [who likes] to deal with learners…[and is]…equipped with a pedagogical (or andragogical) understanding of the learning process, and have a set of learning activities at their disposal by which to orchestrate, motivate, and assess effective learning (p. 360).

In this respect, the instructor who participated in the study already displayed similar e-teacher behaviour to enhance both online and face-to-face student learning in the blended synchronicity. He demonstrated multi-role leadership to enhance the students' learning in the process of the blended synchronous course. Thus, his e-teacher role is further argued as a form of teacher leadership (Lieberman & Miller, 2004). This interpretation may address Garrison's (2011) role issue of teaching presence and Garrison et al.'s (2012) findings about the central role of teaching presence in online and blended learning contexts.

By basing on the results of the study, the role of teaching presence, as the researchers were concerned, is regarded as e-teacher leadership. That is 'Teachers who are leaders lead within and beyond the classroom, identify with and contribute to a community of teacher

learners and leaders, and influence others towards improved educational practice' (Katzenmeyer & Moller, 2001: p. 17). Thus, the role of teaching presence is to facilitate student learning in an online/blended atmosphere of social and cognitive presences that aims to attain the intended outcomes of the learning process. It also contributes to communities of inquiry for advancement of knowledge. This conception of leadership, however, requires further study.

This case study believes that the instructional effects of the teaching, social and cognitive presences as the instructional components provide a proactive form of intervention through multiple instructional roles that establishes an appropriate social climate for meaningful discourse among the course participants. The instructional roles of these components may vary in different instructional approaches to different blended learning and teaching modes. Whether the roles of the three presences are balanced is subject to the specific context in which the course participants are situated.

In this study, the teaching presence component took the prominent role in building a blended synchronous community of inquiry for the online and the face-to-face students. The social or cognitive presence components may dominate in shaping online educational experiences in other online contexts. Thus, this study tentatively suggests that the online experience is context specific, which is a challenge for students, instructors and course developers/designers. The CoI instructional approach must thus be adjusted and fine-tuned for different course participants in different online contexts. This finding, along with the finding on the role of e-teacher leadership in implementing the three instructional presence components, opens up avenues for further research.

5. Conclusion

This case study is significant in applying the CoI framework as an instructional approach to an entire course and also in light of the recent development of the framework (Garrison, 2011; Garrison & Akyol, 2013). As Hong Kong is a small place, the case study may not have been representative of the blended synchronous context. However, it is of particular value for higher education institutions in other regions with similar instructional practices. Although it does not aim to generalise, the results suggest an alternative way of further study of the CoI framework to those suggested by other researchers (e.g., Shea et al., 2012).

The study explores the framework from conceptualisation in online learning to contextualisation in blended synchronous learning and teaching. The instructional effects of the teaching, social and cognitive presences we have identified are limited to one class situated in the specific subject context. For further research, the CoI instructional approach to multiple classes across subjects can reveal the changing instructional roles and effects of the three presences. Equally important, e-teacher leadership is not only an interpretation of the unattended meanings of the leadership role of the teaching presence, as researchers (Akyol & Garrison, 2011; Garrison et al., 2012) have suggested, but is also a potential research area. The key is how e-teacher leadership connects with the social and cognitive presences in the CoI instructional approach and contributes meaningful educational experience in the online, face-to-face and blended learning contexts.

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