Asynchronous Discussions to Enhance Online Communities of Inquiry in the Saudi Higher Education Context

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Abstract

This paper aimed to examine the efficiency of web-based asynchronous discussions in establishing and sustaining online collaborative learning communities in the Saudi higher educational context, by adopting the Community of Inquiry (Garrison et al., 1999) framework as a guiding model. The implementation involved setting up online asynchronous discussions in the Blackboard Learning Management System for a fourth-year undergraduate Education course over 20 days. By using a mixed methodology approach, the results revealed that within the Saudi university context, social presence patterns changed over time, with an overall increase in their levels. This increase attributed to three main factors: the instructors' effective participation; peers' active contribution; and the student's desire to receive higher marks. However, the levels of students' cognitive presence did not show adequate growth, which is assigned mainly to an inadequate teaching presence. The study also explored the relationships between the three factors and concluded that in order for students to achieve their goals via online learning communities, time is an important consideration.

Keywords: online asynchronous discussions, community of inquiry, Saudi higher education

1. Introduction

The existence of a relationship between collaborative communities of inquiry and providing a valuable learning experience has been widely accepted (Ngubane-Mokiwa & Khoza, 2021; Rolim et al., 2019; Shea et al., 2022 Wegerif, 2007). Combining this concept with the evolution in learning communication systems, several studies have revealed the effectiveness of text-based asynchronous discussions in enhancing such communities of learners (Chen et al., 2017; Delello et al., 2019; Shea et al., 2010; Tzelepi, 2020). In the literature on online learning discussions, one of the leading models employed to conceptualize online learning communities is the Community of Inquiry (CoI) framework proposed by Garrison et al. (1999). While this concept was initially applied in traditional educational settings, it has become an ideal model for improving online learning communities due to its valuable insights and its methodological approaches to investigating, examining, and enhancing such communities. Shea et al. (2010), note that 'the community of inquiry (CoI) framework has become one of if not the leading model guiding research on online teaching and learning in higher education' (p. 10). In this context, several experimental studies examining online discussions have confirmed the positive impact of this framework in terms of cognitive enhancement (Fiock, 2020; Galikyan & Admiraal, 2019; Rovai, 2002), promoting a sense of belonging among learners (Peacock & Cowan, 2019), and boosting general levels of learning satisfaction (Ke, 2010; Sadaf et al., 2021).

The CoI model suggests that meaningful educational experiences can be provided online by ensuring adequate levels of the three core factors of learning: social presence, cognitive presence, and teaching presence. Social presence refers to learners' sense of belonging to a community, while cognitive presence implies the ability to build meaning through communications. The teaching presence component indicates to the role that the instructor should play socially and cognitively to establish and maintain learning communities (Garrison et al., 1999).

Although the efficiency of online discussions in constructing and sustaining learning communities has been extensively examined in Western educational environments (Galikyan & Admiraal, 2019; Koszalka et al., 2021), there are few research studies on this area in the Saudi educational context, as is revealed by searching educational databases such as ERIC, EBSCO, Elsevier and Google Scholar in both Arabic and English. Considering this gap in the literature, and the importance of collaborative and inquiry-based learning activities in advancing the role of

online educational platforms in supporting academic achievement (Shin et al., 2020), the current research examined the role of asynchronous discussions in enhancing learning CoIs in the Saudi higher education context. The results of this study provide more evidence of the predictive relevance between the CoI framework and perceived learning discussions in online environments. Further, the inferences drawn from the study could contribute to the larger conversation about improving the use of online platforms to achieve educational purposes.

2. Literature Review

2.1 Asynchronous Educational Discussions

Online asynchronous discussions allow multiple users to participate in open discussions with each other without requiring the interlocutors to contribute actively at the same time. In educational contexts, such discussions have been found to have many favorable impacts. One of these is promoting collaboration among learners (Osborne et al., 2018), and increasing the focus on learners' contributions to discussions compared with traditional oral classroom communication, which tends to concentrate on the instructor's input (Al-Husban, 2020). These online discussions are an effective way to provide educational activities that encourage learners to build and negotiate meaning, involving them in meaningful dialogues and enhancing critical thinking discourses (Wegerif, 2007). Asynchronous discussions also are a method of creating learning dialogues that are free from spatial and temporal limitations. In addition, such learning discussions can form incubator environments for educational communities of inquiry.

2.2 Communities of Inquiry

The philosophical origins of the concept of CoIs lie in the work of Peirce (1955), which rejects the notion that the construction of knowledge can be achieved through introspection, calling instead for following a method of scientific investigation that employs interpersonal methods for producing knowledge. In most of its aspects, the genesis of this model also recalls the work of John Dewey (1995), who developed principles of discovery learning and democratic educational practices (Kovalainen et al., 2001; Swan et al., 2009).

The CoI as a conceptual model assumes that meaningful educational experiences require optimal levels of the three essential factors: teaching presence, social presence and cognitive presence. Repetative The framework adopted for this research as a model was primarily designed to examine these factors and their interrelationships within computer-mediated communication environments in higher education (Garrison et al., 1999). As Figure 1 shows, the framework presumes an overlapping relationship between these three elements.

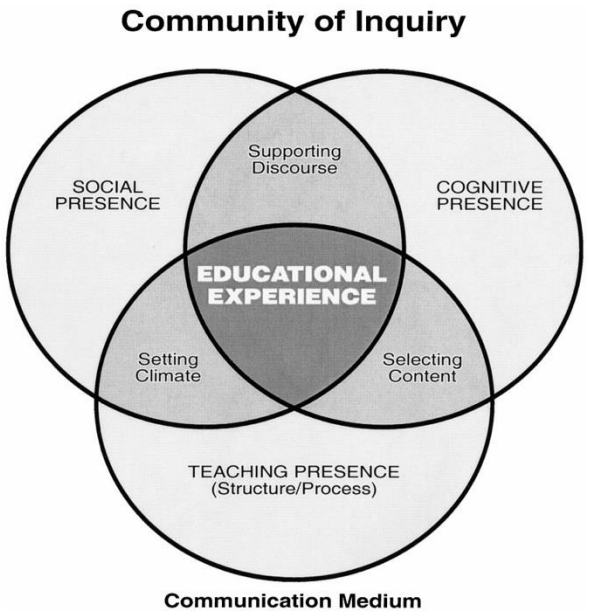

Figure 1. Elements of an educational community of inquiry (Garrison et al., 1999).

2.2.1 Cognitive Presence

Cognitive presence indicates to critical thinking or practical inquiry, which is defined in this model as the extent to which students can build and confirm meaning through engaging in critical learning discussions (Garrison et al., 2001). Cognitive presence and its related sub-skills are considered to be among the most significant factors in preparing learners to be successful in the modern era (Wegerif et al., 2015). Based on the findings of several empirical studies, this factor can be developed and maintained in effective CoIs (Morueta et al., 2016; Rolim et al., 2019).

The practical inquiry model is the core engine that drives cognitive presence. As Figure 2 below shows, this model involves a four-stage process with two dimensions.

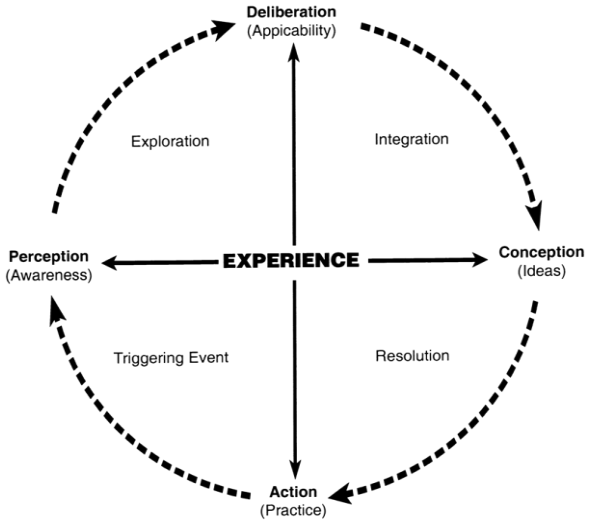

Figure 2. Practical inquiry (Garrison et al., 1999).

The first dimension represents a continuation between execution and deliberation, whereas the second exemplifies the transition between abstract and concrete spaces. The four stages of the model relate to the cognitive aspects of educational processes in general. These stages together reflect a logical gradation of critical inquiry, beginning with a triggering event and following through exploration and integration to a final resolution stage (Garrison et al., 2001). Celentin (2007) demonstrated the challenges associated with the progressive development of their contributions, and moves beyond the understanding and exploration stages while participating in learning web-based discussions. One explanation for these challenges is that the integration and resolution phases require more time than the understanding and exploration stages (Meyer, 2003), because the time period allocated to discussion plays a vital role in raising the level of criticality in the discourse that emerges. The second aim of the study arose from this issue: studying the level and quality of cognitive presence achieved through asynchronous educational discussions held in the Saudi higher education context .

The literature on cognitive presence suggests that the pattern of cognitive presence in online learning discussions is closely associated with the degree of teaching presence (Arnold & Ducate, 2006; Celentin, 2007). It has also been shown that the nature of discussion questions and tasks has a noteworthy influence on determining the degree and type of cognitive presence that emerges from online learning discussions (Arnold & Ducate, 2006). In addition, Garrison and Arbaugh (2007) assert that shared aims that require collaborative efforts to help interlocutors advance to the resolution stage. The quality of instructional design and the organization of the discussions are thus both critical to drive students to reach the resolution stage in their contributions. In sum, as Garrison & Arbaugh (2007) note, '[there is] a complementary relationship between teaching presence and cognitive presence' (p. 163). Based on this information, this study also provides a further exploration of the impact of teaching presence on cognitive presence in the third study question: 'Within the Saudi educational context, does social and teaching presence influence cognitive presence in asynchronous discussions?'

2.2.2 Social Presence

The Social Presence dimension of CoI refers to 'the ability of participants in a community of inquiry to project themselves socially and emotionally, as "real" people i.e., their full personality, through the medium of communication being used' (Garrison et al., 1999, p. 94), and involves three categories of social activity: emotional expression, open communication, and group cohesion. The importance of social presence can be understood in terms of its influence on cognitive presence; levels of cognitive presence have been shown to be associated with the degree of social presence (Morueta et al., 2016; Rolim et al., 2019). In this context, reviewing studies in this area shows a significant positive relation between the existence of social presence and effective levels in students' participation in web-based educational discussions, and the achievement of the intended learning outcomes of conducting such discussions (Anderson et al., 2001; Tu, 2000; Williams et al., 2006).

Therefore, a purpose of this study was to investigate the level of students' social presence in asynchronous educational discussions conducted within a Saudi university context, as indicated in the first research question: 'Within the Saudi higher education context, what are the patterns and levels of social, cognitive and teaching presence that emerge through asynchronous discussions?'. In addition, relying on the above information, the study also examines the influence of social presence on cognitive presence, as indicated in the third research question: 'Does social and teaching presence influence cognitive presence in asynchronous discussions?'.

Research into online asynchronous experiences also shows that establishing effective communication and social relations in the frame of discussions requires that community members feel secure enough to communicate openly and work toward a shared goal (Bostancioglu, 2016; Schaefer et al., 2019; Thompson & MacDonald, 2005). In addition, several empirical studies in this context emphasize that teaching presence plays a pivotal role in the enhancement of social presence in discussions (Kozan, 2016; Shea et al., 2010; Swan & Shih, 2005); and the effective levels of teaching presence in discussions result in the promotion of social presence among students (Kozan, 2016; Shea et al., 2010, Zilka et al., 2018). Using these perspectives, this study also examined the impact of teaching presence on students' sense of social presence, as reflected in the second research question: 'Within the Saudi higher education context, does teaching presence influence social presence in asynchronous discussions?'

2.2.3 Teaching Presence

Prior research acknowledged a pivotal role of teaching presence in the formation of a purposeful online learning community (Kozan, 2016; Shea et al., 2010; Zilka et al., 2018). Teaching presence comprises three criteria: instructional organization, facilitating discourse and direct instruction, which are addressed in the following sections. The consensus therefore is that teaching presence is a crucial foundation for establishing an effective social and cognitive presence.

2.2.3.1 Instructional Design and Organization

Instructional design and organization involves planning the formation, processes, interactions and assessment aspects of an online educational experience (Anderson et al., 2001). The literature suggests a number of activities that fall into the category of teacher presence in online asynchronous discussions, such as offering lecture notes and presentations on a course site, scheduling personal and group tasks, and providing guides to explain how to participate efficiently in discussions (Garrison & Arbaugh, 2007). Indeed, interactive communication demands a clear structure in order to foster the transition to more sophisticated levels of knowledge co-construction (Zydney et al., 2012).

2.2.3.2 Facilitating Discourse

In online asynchronous discussions, facilitating discourse is most often associated with focusing and guiding discussions by encouraging, acknowledging and supporting learner contributions, seeking consensus, identifying the degree of agreement and disagreement on a given issue and participating in meaning-making (Garrison & Arbaugh, 2007). According to Shea et al. (2010), instructors must recognize how to facilitate constructive discourse for the establishment of an ideal teaching presence, which in turn influences cognitive presence.

2.2.3.3 Direct Instruction

Direct instruction plays a significant role in ensuring that learners acquire knowledge and that learning discussions maintain focus (Zydney et al., 2012). Anderson et al. (2001) report that direct instruction is established by an instructor's display of intellectual and academic leadership. One purpose of direct instruction is to facilitate critical thinking by providing content and using different methods of evaluation and giving feedback during discussions. Thus, instructors must be experts in terms of both content and pedagogical approach (Garrison & Arbaugh, 2007).

According to Arbaugh (2001) and Baker (2004), this indicator should achieve high rating of teaching presence to build a productive online community.

Based on the above information about the three categories of teaching presence, this study also aims to examine the patterns and levels of contributions that instructors offer within asynchronous educational discussions within the Saudi higher education context.

From the above, the categories of the three CoI presences and their associated indicators are summarized below in Table 1.

Table 1. Community of inquiry template (Garrison et al., 1999, p. 89).

Elements	Categories	Indicators (examples only)
Cognitive Presence	Triggering Event	Sense of puzzlement
	Exploration	Information exchange
	Integration	Connecting ideas
	Resolution	Apply new ideas
Social Presence	Emotional Expression	Emotions
	Open Communication	Risk-free expression
	Group Cohesion	Encouraging collaboration
Teaching Presence	Instructional Management	Defining and initiating discussion topics
	Building Understanding	Sharing personal meaning
	Direct Instruction	Focusing discussion

Based on research associated with the role of asynchronous discussions in enhancing learning CoIs in the Saudi higher education context (Alharbi, 2018; Alzahrani, 2017; Bokhari, 2016), the following research questions are posed:

Within the Saudi higher education context:

1. What are the patterns and levels of social, cognitive, and teaching presence that emerge through asynchronous discussions?
2. Does teaching presence influence social presence in asynchronous discussions?
3. Does social and teaching presence influence cognitive presence in asynchronous discussions?
4. Why do students' social and cognitive presence levels and patterns change during the course?

3. Research Design and Methodology

3.1 Setting and Participants

The data for this study were collected from a fourth-year undergraduate course in the Education College—Production and Use of Teaching Aides—with 66 students divided into two sections: Cohort 1 (34 students) and Cohort 2 (32 students). The two sections were led by the same instructor. There were no crucial differences between the two sections, but the researcher sought to increase the size of the study sample in order to reinforce the reliability of the results. Each cohort was separated into small groups of five to six students. The group sizes correspond with research recommendations in this field. Qiu et al., (2014), summarized a range of studies on the ideal group size of web-based discussions, concluding that '[m]any researchers advocate for smaller groups, arguing that individual voices are "lost" when group sizes become too large… the 5-student group significantly outperformed other groups of two to seven' (p. 290). The course was offered at a large public Saudi university. The course's primary mode was face-to-face instruction, with an online support component using the Blackboard system as a learning management system to deliver certain educational elements, including providing course materials and

communicating with students. The discussion forum that was the focus of this study was embedded in this Blackboard environment.

The discussion topics were drawn from the course curriculum, and students were given 10 days to participate in each discussion. The first topic was to explore the effectiveness of an educational tool using a set of criteria, while the second asked the students to provide an educational aid and then examine it using pre-defined concepts. The two threads were stimulated by the same questions, and the instructor was an active contributor in the discussions, which created opportunities to analyse the impact of her participation. The tutorials conducted on campus were used to encourage learners to participate in the discussion forums. Contribution in the discussions was valued 3% of the course evaluation, and learners received points depending on how well they met the criteria for both the quantity and quality of their posts.

3.2 Research Methodology

Along with the complexity of studying online discussions and educational discourse in general (Garrison et al., 2006), it has been advocated in the social research field to using multiple sources of data and mixed methodologies, to give studies a profundity and clarity that is not possible with only quantitative or qualitative analyses (Creswell, 2013). In addition, combining multiple data and applying various methods can help to increase the validity and reliability of results by reducing the restrictions of different methods and ensuring that they complement one another. Therefore, the present study used a mixed methodology approach that included quantitative analysis of the discussion content and qualitative analysis of semi-structured interviews conducted with a number of study participants.

3.2.1 Quantitative Discussion Analysis

The content of the discussions was collected from the instructor who led the course. This content was subjected to quantitative analysis to examine how the three factors of CoIs developed as the discussions progressed and to investigate how these factors influenced each other. Hence, this analysis was used to help in answering the first three research questions.

Content analysis of the discussions was conducted by the researcher. There were a total of 330 posts: 137 posts in Cohort 1 and 193 in Cohort 2. The study adopted the CoI framework proposed (Garrison et al., 1999) as an instrument to analyse the discussions content. This model suggests that a learning CoI encompasses of three types of presence Factors (teaching, cognitive, and social), each separated into categories. Shea et al. (2010) developed a more detailed coding scheme for Garrison et al.'s (1999) framework by adding new indicators, definition and examples for each category. The present study used this coding scheme to analyse the discussions quantitatively.

The coding process adopted an entire post as the unit of analysis. Although there are different opinions about what units of analysis i.e. posts, paragraphs, sentences or themes, should be adopted, the current study adopted Anderson et al.'s (2001, p. 11) observation that '[t]he use of message units is less time-consuming and facilitates unit reliability'. Based on Shea et al.'s (2010) coding scheme, the project completed the coding process of the discussions by reading each post and coding it based on its connection for a suitable indicator, as the following post response from the instructor example suggests:

> Truly, Fatima, I like your point about critical thinking and how it can be applied.
>
> Amal, you have also mentioned a good idea about activities that can be associated with these tools.

Analysing this post revealed that the instructor was acknowledging and reinforcing student contributions. Hence, based on table of the coding scheme for teaching presence, the post was coded as teaching presence- facilitating discourse indicators (FD) - encouraging, acknowledging or reinforcing student contributions (FD3).

3.2.2 Qualitative Semi-Structured Interviews

Although the quantitative analysis aims at examining the development of the three elements of CoI and how they influence each other, it was unable to explain factors behind such development, nor how such influence affected the students and let them change the level and pattern of their contributions. For example, it was possible to know using quantitative analysis that teaching presence affects the students' social presence, but it was difficult to explore how this affected the students. Hence, the study intended to also employ reflective interviews with learners and instructors to gain additional understanding of the influential factors on their engagement in the discussions. This method was applied to answer the fourth question of the study, exploring the factors behind learners' changing levels and patterns of social and cognitive presence in discussions. The interviews additional allowed instructor to present her perspectives about these aspects based on her observations.

The interviews were conducted using the instant messaging application with four students, two from Cohort 1 and

two from Cohort 2, and their instructor. The interviews involved of two key questions followed by sub-questions and a free exchange of ideas between the interviewer and interviewees based on their responses to the questions. The questions were as follows:

- What were the motivations that encouraged you to raise the amount or change the style of your participation in the discussions?
- What were the negative factors that led you to reduce or change the style of your participation in the discussions?

To analyse the interviews, the researcher compiled a thorough database of all the responses and applied open coding to find the potential meanings and perceptions. The researcher carefully read all replies and analysed them in order to summarise their meanings, and then identify the primary themes that appeared to cover them. As a result, a theme was identified for each meaning, such as peer influence for all responses that addressed the influence of members on each other as the discussions progressed.

4. Results

4.1 Quantitative Analyses Results

To address the first research question, the present study produced statistical data using Statistical Package for the Social Sciences version 24 software, by analysing the overall variations in each type of presence over time using analysis of variance (ANOVA) with repeated measures (Akyol and Garrison, 2008). Regarding the second and third research question, this study conducted statistical analyses that assessed the potential relationships between the types of presence using linear regression in Microsoft Excel, as suggested by Shea et al. (2010).

4.1.1 Overall Participation in Discussions

Table 2 reports on the overall participation in the discussions.

Table 2. Overall Participation

Category	Discussion 1		Discussion 2	
	Cohort 1	Cohort 2	Cohort 1	Cohort 2
Total Number of Students Enrolled	34	32	34	32
Total Number of Students Participating	26	31	28	31
Total Participation*	42	73	73	99
Participation Rate	76%	97%	82%	97%
Average Participation per Student	1.24	2.28	2.15	3.09

Note: * Instructors' contributions were excluded from calculations.

It is evident that the students' involvement in the discussions was relatively high. For Cohort 1, the total dialogues involved 76 and 82 percent of the class with an average of 1.24 and 2.15 posts per student in the first and second discussions, respectively. Cohort 2 participated at a rate of around 97 percent in both the first and second discussions, in which the average posts per student were 2.28 and 3.09, respectively. These results show that the average participation increased over time for both Cohorts 1 and 2, which confirms that online communities develop over time (Garrison & Arbaugh, 2007).

4.1.2 Social Presence

To address the first research question, the social presence patterns and levels were examined in the discussions by coding content for three categories: group cohesion, affective expression and open communication. Table 3 below displays the average of participation per student for the three categories. For example, the average number of Cohort 1 student posts classified as open communication in the first discussion was 0.18.

Table 3. Average Social Presence Categories per Student

Social Presence	Discussion 1		Discussion 2	
	Cohort 1	Cohort 2	Cohort 1	Cohort 2
Affective Expression	0.00	0.03	0.18	0.09
Open Communication	0.18	0.84	0.53	1.09
Group Cohesion	0.06	0.03	0.09	0.00
Total	0.24	0.91	0.79	1.19

To determine whether the students changed their social presence in discussions over time, the variance of social presence patterns over time was analysed using a 3X3 ANOVA with repeated measures. The factors analysed were time i.e. Discussions 1 and 2, and the three categories of social presence. The data revealed a statistically significant time by category interaction effect ($p = .049$) on social presence. In other words, the students' average participation in the three categories of social presence changed as the discussions progressed.

4.1.3 Cognitive Presence

To address the first research question, this study also explored cognitive presence levels and patterns, which were measured by coding the discussions for four categories: triggering event, exploration, integration and resolution. The average of participation per student for these four categories is shown in Table 4. The data showed that the highest levels of student cognitive presence was in exploration and integration, whereas the students failed to include the resolution pattern. The category of triggering event was also absent in students' participation in the first discussion, while a low level of triggering events appeared in the second discussion.

Table 4. Average Cognitive Presence Categories per Student

Cognitive Presence	Discussion 1		Discussion 2	
	Cohort 1	Cohort 2	Cohort 1	Cohort 2
Triggering Event	0.00	0.00	0.29	0.25
Exploration	0.41	0.75	0.71	0.94
Integration	0.59	0.63	0.35	0.72
Resolution/Application	0.00	0.00	0.00	0.00
Total	1.00	1.38	1.35	1.91

As in the social presence analysis, a 3X4 ANOVA with repeated measures was applied to highlight any changes in cognitive presence patterns in students' contributions from the first to the second discussion. According to the results, time by category interaction did not have a statistically significant influence on cognitive presence ($p = .32$). That is, this statistical analysis did not find sufficient evidence that students change their cognitive presence patterns in discussions over time.

4.1.4 Teaching Presence

Remaining with the first research question, the teaching presence levels and patterns were analysed by coding the discussion contents for three categories: direct instruction, discourse facilitation and design and organisation. As Table 5 reveals, the instructor in question showed a notable tendency towards contributions associated with discourse facilitation and design and organisation, whereas direct instruction was absent in the first discussion and appeared only at a low level in the second discussion.

Table 5. Average Teaching Presence Categories per Student

Teaching Presence	Discussion 1		Discussion 2	
	Cohort 1	Cohort 2	Cohort 1	Cohort 2
Design and Organisation	0.21	0.19	0.21	0.19
Discourse Facilitation	0.03	0.19	0.09	0.06
Direct Instruction	0.00	0.00	0.12	0.03
Total	0.24	0.38	0.41	0.28

A 3X3 ANOVA with repeated measures was also applied to determine whether any variations showed up in teaching presence patterns over time. Based on the data, time by category interaction did not demonstrate a statistically significant influence on teaching presence ($p = .50$) as the discussions progressed.

4.1.5 Relationships between Teaching, Social, and Cognitive Presence

The potential causal relationships among the CoI elements reflect the effect of teaching presence on social presence and the influence of social and teaching presence on cognitive presence. The following subsections examine these relationships using linear regression analysis supported by a graphical representation of the data.

4.1.5.1 Relationship between Teaching and Social Presence

Figure 5 below presents information about the potential correlation between the average teaching presence and social presence identified through content analysis.

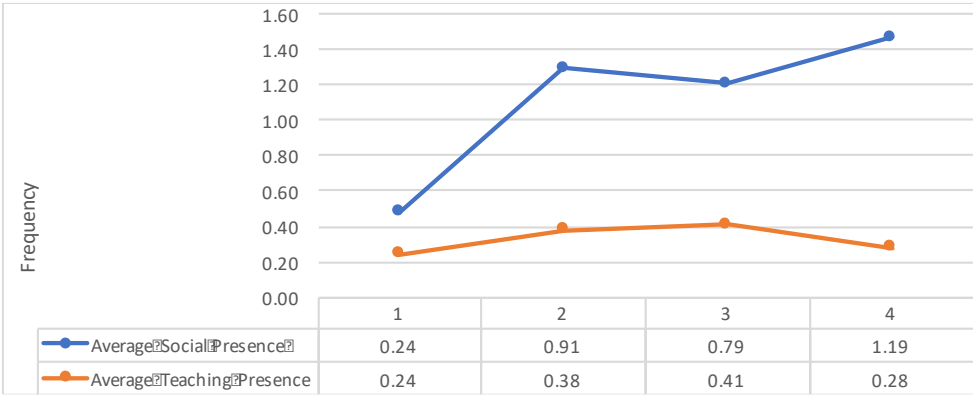

Figure 3. Average Teaching Presence Versus Social Presence

This graphical representation appears to show a moderate relationship between these variables. A linear regression analysis was also conducted with these two variables over time. The value of correlation coefficient (r) in this analysis, which describes the degree of the linear dependence between two variables, reveals a moderately strong correlation ($r = .40$) between teaching and social presence. That is, the level of teaching presence moderately influences social presence. However, this finding is not statistically significant ($p = .62$).

4.1.5.2 Relationship between Social and Cognitive Presence

Figure 6 is a graphical representation of the relationship between the students' social and cognitive presence. In contrast to the previous relationship, a strong correlation was found between these two presences. The linear regression analysis, in turn, revealed a very strong correlation ($r = .93$) between these variables, although the statistical significance was marginal ($p = .06$). Therefore, the levels of cognitive presence can be said to be affected positively by increased social presence.

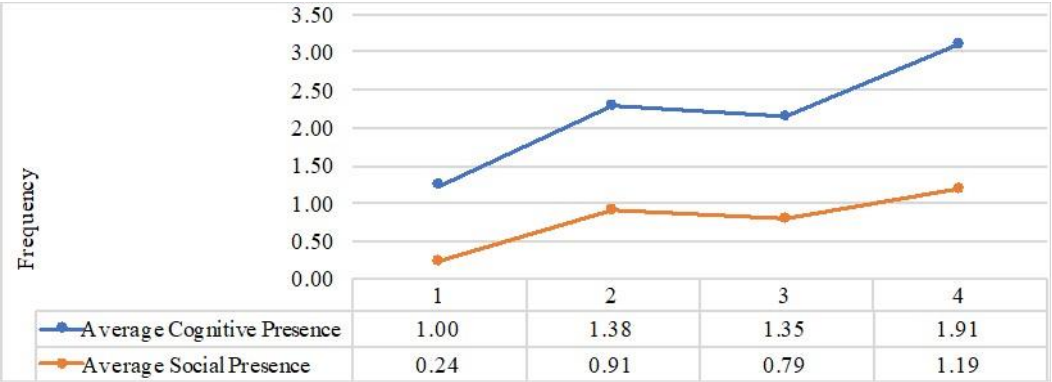

Figure 4. Average Social Presence Versus cognitive Presence

4.1.5.3 Relationship between Teaching and Cognitive Presence

Figure 7 shows the relationship between average teaching and cognitive presence over time, which appears to be weak. This inference is compatible with the results of the linear regression analysis of these variables over time, in which the value of correlation coefficient is weak (r = .10) and no statistically significant difference was found (p = .94). That is, the linear regression analysis did not provide sufficient proof that teaching presence can influence cognitive presence.

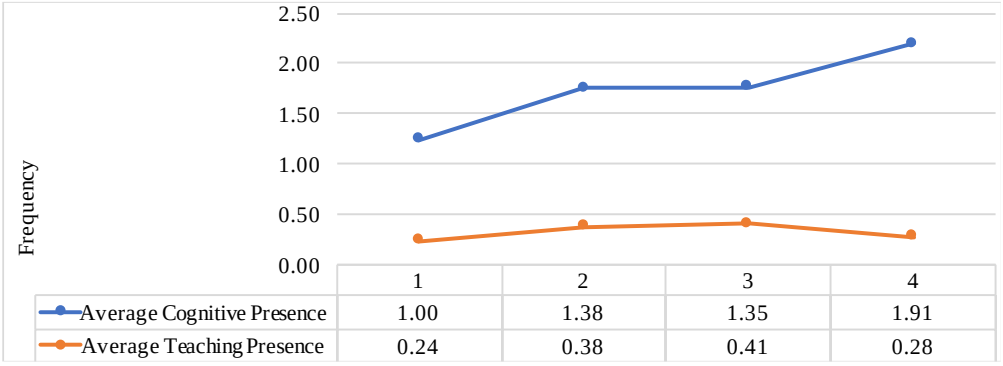

Figure 5. Average Teaching Presence Versus Cognitive Presence

4.2 Qualitative Analysis Results

Semi-structured interviews were conducted to shed light on the findings of the quantitative analyses. More specifically, the interviews were collected to explore the factors behind the changing levels and patterns of students' social and cognitive presence as the asynchronous discussions progressed. The five interviews were conducted with two student participants from Cohort 1 i.e. Nada and Hanan, and two from Cohort 2 i.e. Huda and Sara, while the fifth participant was both cohorts' instructor. All the names used are pseudonyms. The interview questions:

- What were the motivations that encouraged you to raise the amount or change the style of your participation in the discussions?
- What were the negative factors that led you to reduce or change the style of your participation in the discussions?

Analysing the interviews was conducted using open coding to define the primary themes that appeared to summarise interviewees' responses. The three main themes stood out in the data: instructor engagement, peer influence and achievement of marks.

4.2.1 Participants' Overall Impressions

All the participants expressed an interest in continuing to use asynchronous discussions as part of their educational experience. The participants agreed that these discussions create a purposeful educational context offering various learning opportunities. The participants and instructor reported that Blackboard is an easy platform in which to conduct discussions and that several features facilitate these experiences.

Despite different opinions regarding the factors that encourage or weaken their desire to participate and make further contributions, the interviewees agreed on several motivations and barriers. The following subsections present detailed information about these factors (themes) and their impacts.

4.2.2 Instructor Engagement

In a CoI context, this factor refers to the instructor's involvement and interaction with students during discussions, which involves responding to students' contributions, answering their questions, monitoring their overall performance, and giving instructions as needed. From the interviewees' perspective, instructor responsiveness and interaction significantly helped to motivate the class to remain engaged and redirect their participation to satisfy predefined purposes. Despite the different experiences among four students regarding the level of instructor involvement, all four students emphasised the importance of active instructor involvement, as it encouraged them to contribute further and guided their contributions towards more meaningful content and interaction. However, this emphasis on teaching presence contrasts with the quantitative analyses' findings that the relationships between teaching presence and social and cognitive presence were weak to moderate in strength.

According to Nada, '[the instructor] responded quickly to our contributions and mentioned our names, making us feel more motivated'. She added: 'the level of instructor involvement in the discussions was reflected in our motivation to participate in and our enthusiasm for the discussions'. Hanan agreed with Nada that the instructor's active participation in post threads was an important way to raise the class members' awareness of how much attention the teacher paid to their participation. Hanan explained, 'This awareness was an effective way to motivate us to engage in discussions more often'. Sara also specifically appreciated the instructor's method of motivating them to participate more by 'asking for their opinion about a specific member's response'. However, Huda's experience was different: she reported that the role of instructor was absent in her small group and the instructor had not participated in the discussions beyond launching them. Despite her experience, Huda shared a belief in the positive impact of active instructor involvement and expressed her desire for a change that would make the instructor a positive partner in the discussions.

The students also referred to the instructor's vital role in establishing the standards for their dialogues. As the discussions progressed, they changed their manner of responding to follow the instructor's example. Nada highlighted this point when she said, 'The instructor's participation helped me to know how I should formulate my contributions to academic dialogues.' Hanan was further impressed by the way the instructor constructively critiqued the opinions expressed, which provided Hanan with a concrete example of how to give criticism in an educational context.

The instructor reported a similar opinion of the significance of teacher engagement. However, she focused more on the difficulties she faced while leading the discussions. She explained that the tasks related to maintaining teaching presence require considerable time and effort:

> Despite my desire to take part in all group discussions and leave comments and guidance, it was difficult to do that with 13 groups simultaneously… The reason behind the inequality in my participation among groups was to a large extent related to the limited time and energy I had to manage all these groups.

This explains the difference between the experiences of Huda and the other students. It also may help explain the inability of the quantitative results to demonstrate a positive relationship between teaching presence and the other two presences.

4.2.3 Peer Influence

In the context of CoIs, peer influence can be defined as the positive or negative impact of peers' attitudes and performance in online discussions on each class member's engagement. One crucial insight that emerged from the interviews was that these factors influence the levels and patterns of learners' social presence. Overall, from the interviewees' perspective, a relatively strong relationship exists between peer influence and changing levels of social and cognitive presence.

According to the students, their interaction level was commensurate with the overall level of class members'

contributions in terms of the number and content of posts. The interviewees attributed their desire to engage more deeply in discussions to rapid responses and interactive comments from their peers. The students also emphasised the significance of the content of their peers' participation, which encouraged them to address new aspects of the topics and inspired them to improve the quality of their next posts.

Huda felt that active interactions between peers are the main requirement for productive discussions. One of main negative aspects she encountered was some class members' low level of interaction. Hanan also confirmed other members' influence on her contributions by saying:

> They encouraged me to continue my contributions and helped me to generate new ideas and think about other aspects of the topic … My peers' comments motivated me to do more research in order to contribute good content.

4.2.4 Achievement of Marks

Since the instructor gave marks for discussion participation, the interviews also included exploring how these marks affect students' overall presence. The interview data provided proof that a significant factor encouraging students to participate is the motivation to get a good mark. Sara, for example, insisted that this factor strongly encourages students to take part in discussions. She said, 'I think if there were no marks given for discussions, the students' rate of contribution would be very low.' Huda added, 'I think it would be a good idea if the teacher increased the weight of the marks assigned to discussion contributions to make participation worthier of students' consideration.'

The instructor agreed that marks are an important factor that encourages students to participate. She expanded further, 'In this experience, the evaluation process was based only on the individual students' performance, but I assume that this could be enhanced by considering the groups' performance as well.' She explained that the total mark could be separated into two parts: individual performance and group performance, including how well they convince each other and summarise the ideas raised.

5. Discussions

Because this study is guided by the CoI model proposed by Garrison et al. (1999), it assumes that online educational communities involve three essential components: social presence, cognitive presence, and teaching presence. The study findings are reported in relation to these three components.

5.1 Findings Related to Social Presence and its Influences on CoI

The findings related to social presence revealed that it was generally categorized as open communication, with affective expression and group cohesion being valued at extremely low levels. Studies in this area have shown that group cohesion and online discussions are associated with higher-quality educational effects (Dixon et al., 2006; Swan & Shih, 2005), which may refer to an inadequacy in the effectiveness of the social presence that was established in Saudi educational context. However, in this context, Vaughan and Garrison (2005) note that affective and open communication is important in the initial stages of establishing a sense of community among students, while its importance declines as the discussions progressed in favour of group cohesion. The time factor thus plays a vital role in developing social presence and shifting students' interests towards cohesive comments. Proceeding from Vaughan and Garrison's (2005) observation, the low levels of group cohesion found in the present study can be attributed to the time factor, as the discussions lasted less than three weeks. Indeed, this highlights the most important limitation facing the reliability of this study's results.

Another possible explanation for not achieving ideal levels of group cohesion is the nature of the discussion tasks. Analysing the questions initiated in the study discussions revealed that their nature was exploratory; the first topic involved considering the effectiveness of an educational tool by using a set of criteria and the second asked students to provide an educational tool and then examine it using pre-defined principles. These exploratory topics, according to Garrison and Arbaugh (2007), provide less incentive for cohesive comments compared with collaborative topics. Arbaugh (2007) raised another possible explanation for these findings of low levels of group cohesion, arguing that the types of communication that emerge in discussions may differ based on the gender in a sample. Müller (2008) further explains that 'multiple responsibilities, insufficient interaction with faculty, technology, and coursework ranked highest as barriers to women's persistence' (p. 1) within online learning in general. However, the present study did not address this possible factor given the complex sub-issues it raised (see Garrison & Arbaugh, 2007). Thus, more studies to understand influential factors that can affect social presence development are recommended.

Both the quantitative and qualitative data revealed a strong relationship between social and cognitive presences. This corresponds to other studies' results that the levels of intellectual interaction in online dialogue are positively affected by members' sociability (Beuchot & Bullen, 2005; Garrison et al., 2006; Williams et al., 2006). However, it is worth

noting that these studies do not claim that social presence alone ensures enhanced cognitive development through online communities; rather, they suggest that social presence provides an important foundation for developing such presence (Garrison & Cleveland-Innes, 2005). In this respect, educationalists highlight the importance of establishing social presence as part of the purposeful nature of learning communication. Garrison and Arbaugh (2007) asserted that 'social presence should not be measured simply in terms of the quantity of interaction it engenders… Personal relationships and interaction must be defined in academic terms' (p. 161). Though the present study did not examine further the nature of relationships among community members, it strongly advocates further studies investigating how to develop a social presence for academic purposes.

5.2 Findings Related to Cognitive Presence

Cognitive presence comprises four consecutive stages: triggering event, exploration, integration and resolution (Garrison et al., 2001). The integration and resolution stages represent the highest levels of cognitive functions. The quantitative results indicated that most students' participation was classified under exploration and integration, while there was no participation classified as resolution. This finding highlights the difficulty in moving the process of inquiry beyond the first two phases of the cognitive development cycle, as already reported in several studies of online learning communities (Celentin, 2007; Shea et al., 2010; Vaughan & Garrison, 2005).

Two explanations have been provided for this difficulty. Meyer (2003) argues that this issue arises because of the time factor, since achieving high-order levels of inquiry through online discussion requires increasing time for reflection. This explanation appears to apply to the present study's discussions, which were not long enough to allow the students to develop their dialogue to reach higher levels of intellectual interactions. Another consideration in interpreting this issue is associated with the efficiency of the instructor's performance. Studies in online learning communities have asserted that reinforcing cognitive aspects of students' contributions requires instructors to provide crucial inputs to ensure that discussions move to high-order levels of cognitive presence (Celentin, 2007; Luebeck & Bice, 2005). However, the teaching presence in the study discussions was not effective enough.

In addition, the statistical analysis of changes in cognitive presence levels and patterns over time failed to prove the existence of changes. This can also be attributed to the same factors of the difficulty of moving students' participations to the resolution phase of inquiry. Lee and Lee (2006) reported another possible factor: inefficiency in the levels of cognitive presence can be assigned to interlocutors' personality types. The authors cited indicate that discussions conducted in groups with learners of mixed personality types achieve higher social and cognitive levels than discussions conducted in groups comprised solely of introverted learners. Although the present study did not focus on this issue due to a lack of data about students' personality types, this aspect is worth further study.

5.3 Findings Related to Teaching Presence and its Central Role

While Garrison et al. (2010) argue that '[t]he evidence supporting the central role of teaching presence in online learning experiences is growing' (p. 5), this presence appeared not to play a central role in the present study of Saudi educational setting. The theoretical foundation of the CoI framework notes that this presence is classified into three categories: instructional design and organization, direct instruction and facilitating discourse. Each involves a set of principles and activities that assist the instructor in realizing teaching presence effectively. In this study, among these three categories, direct instruction showed very low levels of teaching presence in the quantitative findings. However, this category must reach the highest level of instructor contribution (Arbaugh, 2001; Baker, 2004; Richardson & Swan, 2003) if successful learning communities are to be established. The results reflect a side effect of the shortcoming in this presence.

In addition, based on both the quantitative and qualitative data, the instructor did not show ideal levels and patterns of teaching presence during discussions. The quantitative analysis of changes in levels and patterns of teaching presence over time failed to prove the existence of changes, while the qualitative data showed inequality in the instructor's participations among the groups, as indicated by both the instructor's interview and the words of one of the students, who reported that the instructor was never involved with their small group in the discussions.

The linear regression analysis that was conducted to examine the effect of teaching presence on social and cognitive presence did not show positive results, which contrasts with the findings of several other studies (Garrison et al., 2010; Shea et al., 2010; Swan, 2003). Prior studies have acknowledged a significant direct influence of teaching presence on both social and cognitive presence (Blignaut & Trollip, 2003; Garrison et al., 2006; Lim & Barnes, 2002; Shea et al., 2010; Swan, 2003). However, it is worth noting that the qualitative data suggested a consensus among the students on the significance of active instructor engagement as promoting greater participation and directing that increased activity towards more purposeful content and interaction.

Several considerations have arisen to address inefficiency in instructor performance in online learning communities. Research suggests that the nature of discussion tasks—an aspect of the instructional design category—determines the degree and type of cognitive presence that emerges during discussions (Arnold and Ducate, 2006; Meyer, 2004). Swan (2004) emphasizes the importance of providing clear and consistent structure for discussions, such as comprehensive descriptions of the nature of tasks, schedules for participation and guidelines on how to use the platform in order to ensure an effective teaching presence in online communities. In addition, Pawan et al. (2003) noted that questions that facilitate discussions play an influential role in achieving the objectives of the discussion. They added that without clear orientation from the instructor, discussions will turn into 'serial monologues' (p. 119). Based on these suggestions and others, and considering the gap in Saudi higher education research about online learning communities in general, it is important to conceptualize how to provide an effective teaching presence and help instructors by providing clear expectations of how to manage the progression of discussions to build collaborative and constructive learning communities.

6. Conclusion

This study adopts the CoI framework to examine the efficiency of web-based asynchronous discussions in building and sustaining learning communities in the Saudi educational context. This framework suggests that purposeful educational communities can be established online by ensuring adequate levels of the three overlapping elements of learning: cognitive presence, social presence, and teaching presence. To achieve the objective of this study, these three learning components, their inter-relationships, and the factors influencing them were examined.

The findings showed that within the Saudi university context, social presence patterns change over time, with an overall increase in their levels. The results showed that the main factors in the development of social presence were instructors' effective participation, peers' active contribution, and the desire to receive marks. Quantitative analyses of the discussions demonstrated the strong influence of social presence on students' cognitive presence; this corresponds with the modern philosophy of education that considers social interaction a crucial factor in constructing knowledge and cognitive development (Resnick, 1991; Vygotsky, 1978).

However, this positive influence of the social component on cognitive presence was not enough to create adequate levels of students' cognitive presence. The quantitative results did not reveal a statistically significant variation in cognitive levels and patterns over time. These undesired results seem attributable to the inadequate teaching presence. Although studies on online learning communities assert the significance of teaching presence in establishing an effective cognitive presence, this study found that patterns of teaching presence did not reach ideal levels. This was reflected by the low rating of the level of direct instruction, which contrasts with educationalists' recommendations (Arbaugh, 2001; Baker, 2004; Richardson & Swan, 2003). This study also considers that the time factor plays an influential role in the development of both social and cognitive presence (Garrison & Arbaugh, 2007). Hence, this study confirms that online learning communities take time to start achieving their goals.

This study provided numerous implications for Saudi higher education research and practice. Initially, several Western studies of the CoI model have proved the influence of cognitive, social, and teaching presence on asynchronous learning discussions. Thus, the present study enriches the research area of web-based learning discussions in the Saudi higher education context. Second, the results confirm that the CoI framework can be used as a reliable instrument to explore factors influencing the efficiency of online learning discussions. Finally, this study shows that the quantitative findings obtained using the CoI framework can be supported and explained through the qualitative data produced from semi-structured interviews with numerous study participants.

For future research, the study recommends a further examination of social presence and a deep investigation into the factors that can affect its development in the Saudi higher education context. This study also calls for a greater focus on the nature of social relationships among community members when studying this presence to investigate how to enhance it for academic purposes. For cognitive presence, this study strongly advocates considering the nature of the critical discourse that emerges from online discussions and how instructors in the Saudi context should be prepared to direct online discussions to assist their students reach high levels of cognitive function. For teaching presence, this study calls for conceptualizing how to provide an effective teaching presence and providing instructors with clear expectations of how to manage the progression of a discussion to build collaborative and constructive learning communities.

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Appendix A

Table A1. Coding scheme for social presence (Shea et al., 2010, p. 19-20)

Categories	Indicators	Code	Definition	Examples (from the present study discussions)
Affective (AF)	Expressing emotions	SP-AFI	Conventional expressions of emotion	Thank you for your feedback The assigned code is SP-AF1
	Use of humour	SP-AF2	Teasing, cajoling, irony, understatements, sarcasm	
	Self-disclosure	SP-AF3	Presents details of life outside of class, or expresses vulnerability; includes expressions of likes, dislikes and preferences	
	Use of unconventional expressions to express emotion	SP-AF4	Unconventional expressions of emotion. includes repetitious punctuation, conspicuous capitalization, emoticons	
	Expressing value	SP-AF5	Expressing personal values, beliefs and attitudes	
Open communication (OC)	Continuing a thread	SP-OC-1	Using reply feature of software, rather than starting a new thread	Your analysis of the tools is logical and wonderful. The assigned code is SP-OC-5 Yes, I agree with you on this point and with the other principles. The assigned code is SP-OC-6
	Quoting from others' messages	SP-OC-2	Using software features to quote others' entire message or cut and passing selections of others' messages	
	Referring explicitly to others' messages	SP-OC-3	Direct references to contents of others' posts	
	Asking questions	SP-OC-4	Students ask questions of other students or the moderator	
	Complimenting. expressing appreciation	SP-OC-5	Complimenting others or contents of others' messages	
	Expressing agreement	SP-OC-6	Expressing agreement with others or contents of others messages	
	Expressing disagreement	SP-OC-7	Expresses disagreement with other or contents of others messages	
	Personal advice	SP-OC-8	Offering specific advice to classmates	
Group Cohesion (CH)	Vocatives	SP-CH-1	Addressing or referring to the participants by name	Fatemah, I agree with you on this point. The assigned code is SP-CH-1
	Addresses or refers to the group using inclusive pronouns	SP-CH-2	Addresses the group as we., us, our, group	
	Phatic, salutations and greetings	SP-CH-3	Communication that serves a purely social function; greetings or closures	
	Social sharing	SP-CH-4	Sharing information unrelated to the course	
	Course reflection	SP-CH-5	Reflection on the course itself	

Table A2. Coding scheme for cognitive presence (Shea et al., 2010, p. 47-48) - this table was adopted from another version of Shea's et al., (2010) work.

Categories	Indicators	Code	Definition	Examples (from the present study discussions)
Triggering event	Recognize problem	CP-TE-1	Evocative (inductive) Stimulate one's curiosity Core organizing concept or problem	This video contains some of the ten principles, and for some reasons, it skips certain principles. My question for you, after watching this video, is what are the principles that did not apply? [the video was attached with her comment] The assigned code is CP-TE-2
	Sense of puzzlement	CP-TE-2	Dilemma or problem that learners can relate to from their experience or previous studies Framing the issue and eliciting questions or problems that learners see or have experienced Assessing state of learners knowledge and generating unintended but constructive ideas	
Exploration	Exploration within the online community	CP-EX-1	Inquisitive	I see that [this educational aid] is not adaptable, because it is made using materials that are subject to damage, to a large extent. The assigned code is CP-EX-2
	Exploration within a single message	CP-EX-2	Understand the nature of the problem and then search for relevant information and possible explanation	
	Information exchange	CP-EX-3	Group activities – brainstorming	
	Suggestions for consideration	CP-EX-4	Private activities – literature searches	
	Leaps to conclusions	CP-EX-5	Manage and monitor this phase of divergent thinking in such a way that it begins to be more focused	
Integration	Integration among groups members	CP-IN-1	Tentative	I agree with you with regard to the point of the size of the geometric shapes. There is a need to be at the same size to not lead to the dispersion of students and then focus on the sizes instead of shapes themselves. The assigned code is CP-IN-1
	Integration within a single message (response to prompt)	CP-IN-2	Focused and structured phase of making meaning	
	Connecting ideas, synthesis	CP-IN-3	Decisions are made about integration of ideas	
	Creating solutions	CP-IN-4	Teacher must probe for understanding and misconceptions	
Resolution	Vicarious application to real world testing solutions	CP-RE-1	Resolution of the dilemma or problem Reducing complexity by constructing a meaningful framework or discovering a contextually specific solution	No post was coded in these categories.
	Defending solutions	CP-RE-2	Confirmation or testing phase may be accomplished by direct or vicarious action	

Table A3. Coding scheme for teaching presence (Shea et al., 2010, p. 18-19)

Categories	Indicators	Code	Definition	Examples (from the present study's discussions)
Design and organization (DE)	Setting curriculum and communicating assessment methods to be used in the course	DE1	Communicates important course outcomes, e.g. documentation of course goals, topics, rubrics and instructor expectations	In addition to what we have discussed in the first lecture about how to choose an educational aid, a set of principles has been collected to help you select the educational aid that is appropriate for your lesson. The principles are as follows: [a set of principles] In our discussion, we want to assume that we are teachers. We wanted to use the following tools. [a picture show an educational aid] Do you think that the principles are applied? Why? Do you have suggestions for modifications to align the principles?... The assigned code is DE1
	Designing methods	DE2	Provides clear instructions (delete: and expectations) how to participate in course learning activities, e.g., clear explanation of how to complete course assignments successfully	
	Establishing time parameters	DE3	Communicates important due dates/time frames for learning activities to help students keep pace with the course, e.g. accurate course schedule	
	Utilizing medium effectively	DE4	Assists students to take advantage of the online environment to enhance learning e.g., (delete: provides clear instructions on how to participate in discussions, submit assignments and) using LMS features for learning activities and resolving technical problems	
	Establishing netiquette	DE5	Helps students understand and practice the kinds of behaviors that are acceptable in online learning, e.g., providing documentation on polite forms of online interaction	
	Making macro-level comments about course content	DE6	Provides rationale for assignment/topic	
Facilitating Discourse Indicators (FD)	Identifying areas of agreement/disagreement	FD1	Helps to identify areas of agreement and disagreement on course topics in order to enhance student learning.	I agree with you, Nora, that this is a wonderful conclusion. The assigned code is FD3 Truly, Fatima, I like your point about critical thinking and how it can be applied. Amal, you have also mentioned a good idea about activities that can be associated with these tools. The assigned code is FD3 The level of discussion was very good, so thank you for your efforts. However, other tools such as video and software have not
	Seeking to reach consensus	FD2	Assists in guiding class toward agreement about course topics in a way to enhance student learning	
	Encouraging, acknowledging or reinforcing student contributions	FD3	Acknowledges student participation in the course, e.g., replied in a positive encouraging manner to student submissions	
	Setting climate for learning	FD4	Encourages students to explore concepts in the course, e.g., promotes the exploration of new ideas	
	Drawing in participants, prompting discussion	FD5	Helps keep students engaged and participating in productive dialog	
	Presenting follow-up topics for discussions	FD6	Presents content or questions (delete: that enhance learning) i.e., tangential	

	(ad hoc)		(confirm use of tangential) or related (delete: but are outside of the initial design questions??)	been discussed. Can I know your opinions about this method? [web link] The assigned code is FD4
	RE-Focusing discussion on specific issues	FD7	Helps focus discussion on relevant issues (delete: that enhance understanding and) keeps participants on topic	
	Summarizing discussion	FD8	Reviews and summarizes discussion contributions to highlight key concepts and relationships to further facilitate discourse	
Direct instruction (DI)	Providing valuable analogies	DI1	Attempts to rephrase/reformulate course material in ways that highlight similarities between content assumed to be understood and new content with the goal of making the material more comprehensible	The video explaining the digestive system was very informative, and, as you mentioned, it satisfies many of the principles. In addition, it provides information through a story, which will appeal to children's minds and motivate them to learn more. Also, the video may lack distribution and training principles. The assigned code is DI1
	Offering useful illustrations	DI2	Attempts to make course content more comprehensible by providing examples that are substantive and advance understanding	
	Conducting supportive DI3 (informative?) demonstrations	DI3	Attempts to make course content more comprehensible through the exhibition of processes	
	Supplying clarifying information	DI4	Attempts to reduce confusion or misconceptions about course content by providing additional explanations.	
	Making explicit reference to outside material	DI5	Provides useful information from a variety of sources, e.g., articles, textbooks, personal experiences, or links to external web sites.	