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THE CREATION OF VIRTUAL AND FACE-TO-FACE LEARNING COMMUNITIES: AN INTERNATIONAL COLLABORATION EXPERIENCE*

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ABSTRACT

This article examines the use of technology in higher education to support an international collaboration between 2 graduate seminars in cognition and instruction, one in Mexico and another in Canada. The culture of both seminars is described in the context of using computer mediated collaboration systems. The online collaboration between and within the 2 groups happened through the use of the communications tools available in WebCT, a Web-based course management system. The analyses reveal the

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discursive patterns between instructors and students in both settings, with an examination of teacher presence as it pertains to a cognitive apprenticeship perspective, with particular attention to teacher's modeling and scaffolding. We also present the nature of the student interactions in terms of the cognitive elements present in the discourse and the types of social interactions that support the community of inquiry model. Students in both seminars revealed high levels of critical thinking in the types of discussions they engaged in and the types of questions they posed to others. Differences were noted in the types of teacher modeling in the 2 seminars. These differences are explored and future directions are stated for promoting international collaborations in higher education.

Research about how technology affects teaching and learning in higher education is on the rise (Tallent-Runnels et al., 2006). This article addresses the use of a computer-mediated communication (CMC) system, specifically the discussion forums in Web Course Tools (WebCT), to support online classroom discourse in a graduate seminar. CMC extends the classroom by providing more diversified interaction opportunities (King, 2001). The text-based nature of CMC provides a permanent record of discussions whereby students can reflect on their own interventions and make changes if necessary (Seale & Cann, 2000). Moreover, these activities occur within the context of a community that shares knowledge online allowing the analysis of how knowledge evolves, and how the culture of the classroom supports social values and knowledge building (García & Lajoie, 2001; Lajoie & Berdugo, 2001).

This article explores how CMC was used to support an international collaboration between two graduate seminars in cognition and instruction, one in Mexico and another in Canada. We describe the culture of both seminars in face-to-face (FF) settings and in the CMC virtual community. Our analyses examine the discursive patterns between instructors and students from a cognitive apprenticeship perspective, with particular attention to teacher's modeling and scaffolding as well as to the nature of student interactions.

TECHNOLOGY AS A TOOL FOR SUPPORTING LEARNING AND INSTRUCTION

The view of computer environments as cognitive tools for learning emphasizes the potential roles that technology can play within classrooms (Lajoie, 2000, 2005; Lajoie & Derry, 1993). Cognitive tools suggest tools that amplify, extend, and enhance what learners know and understand (Jonassen & Reeves, 1996; Pea, 1985; Salomon, Perkins, & Globerson, 1991). Cognitive theories drive the design of such tools in order to promote specific cognitive skills. These theories include the social aspects of tool usage, supporting the *communities of*

learners (Brown & Campione, 1990) and *cognitive apprenticeship* (Collins, Brown & Newman, 1989) frameworks.

Cognitive tools can be designed to extend classroom experiences beyond FF interactions or *physical communities* to *virtual communities* of learning that lessen space and time constraints (Renninger & Shumar, 2002). CMC systems afford the opportunity to create international virtual communities of learning where participants work on shared interests at their convenience.

THE CONTEXT

Two graduate seminars in cognition and instruction were conducted concurrently in Canada (McGill University) and in Mexico (UNAM). Grounded methods of data analysis were used to observe how technology was used to support learning. The choice of these two sites was opportunistic. The authors collaborated in the past and were interested in using their own classrooms as test-beds for cognitive apprenticeships and communities of learning with the intent of developing an international graduate community interested in cognition and instruction. The research was informed by the instructors' experience in their respective classrooms, motivating their belief that the curriculum content could be shared, that there would be sufficient translation within the classrooms to overcome language barriers, and that there would not be student differences in access to technology. The data are descriptive and provide a case study in how technology can be used to support learning both within and across classrooms in different countries. The intent was to use this exploratory data to provide the groundwork for future empirical work in this area.

The Curriculum

The course provided a theoretical foundation for students interested in pursuing research in the area of cognition and instruction. The course objectives were to provide opportunities for students to learn how to critically analyze and discuss articles and establish a theoretical background in this area. The instructors encouraged scientific discourse by modeling questions that fostered student engagement, in FF and CMC situations. The goal was to promote conceptual understanding and development by helping students appropriate the meanings in the discourse of the area taught (Pea, 1993). The interactions between teacher and students took place in the context of the traditional classroom seminar and online using CMC. Modeling a professional conference with topic-based symposiums, discussants, and time for discussion after each symposium provided an authentic context for international collaboration. Students were working toward this conference goal by preparing and ultimately presenting their papers to each other.

The UNAM instructor, a former student of the McGill instructor, chose to adopt 90% of the McGill course content and supplement the remainder with Spanish references to ease reading comprehension and relevance for her students. In the first sessions, instructors modeled the type of question format that could be used to stimulate scientific discourse. Then individual students were asked to volunteer to be discussion leaders for specific sessions based on their specific research interests. Each leader created discussion questions based on the readings that were assigned for a particular topic. The instructor would review and provide feedback on these questions prior to their posting, which happened during the week preceding the discussion.

The course was structured to allow both a local classroom culture to grow as well as a shared international culture to evolve. The adopted CMC system consisted of three types of knowledge forums that reflected the linguistic, cultural, and geographic constraints that we faced, one that was local to McGill, one local to UNAM, and another that was open to both institutions. We describe the McGill and UNAM experiences and end with some general conclusions about the global experience.

METHOD

Participants

Thirteen graduate students from McGill and seven from UNAM volunteered to participate in the study. We were interested in the natural rather than the compulsory use of the CMC. Therefore, students were not graded on their online communications. Introducing grades for messages may have increased the number and perhaps quality of the messages. However, we were interested in the use of CMC without the external incentive of grades.

The Instructional Setting

The seminar's internal structure was based on a community of learner's model where students engaged in reading, writing, and discussions rather than listen to lectures. The community of learners model is conceptualized as a jigsaw system where different people in the classroom major in different types of expert knowledge which they later share with the classroom. The instructor served as the expert by modeling to the students the type of format the class would follow. She scaffolded them in class to enhance the scientific discourse. Then each student became an expert at one topic during the semester. Each student chose a topic of interest and worked with the instructor in preparing discussion questions based on the assigned readings. The student-expert posted the final discussion questions on WebCT one week before their topic was discussed in class. Thus,

peers viewed the questions ahead of time and asked questions of the discussion leader either before or after class. The instructor worked with the student in the development of these questions, and scaffolded them in class to enhance the scientific discourse. Learning was a shared activity among the members of the classroom community.

McGill students held weekly meetings throughout the semester and logged onto WebCT to continue discussions at their convenience. The UNAM instructor switched to a structured approach when she observed student difficulties with second language comprehension and use of WebCT tools. Their seminar took place in a computer laboratory where the instructor could demonstrate the use of tools (e.g., how to attach files). This arrangement helped familiarize students with the affordances and constraints of CMC.

Students posted the discussion questions prior to FF meetings. McGill students answered these questions in the FF meetings whereas UNAM students engaged in responses to questions online as soon as they were posted. McGill students used WebCT to continue the dialogue that started in FF meetings as well as pursue topics of interest throughout the semester. At UNAM, the instructor limited the online discussion to the weekly questions so that students could be prepared for the FF sessions. She chose this method when she recognized the student difficulties described above.

ANALYSES

Data Collection and Coding

WebCT postings were analyzed to examine the underlying cognitive and social processes of both students and instructors. The postings were used as verbal records (Chi, 1997; Ericsson & Simon, 1993) of students' articulation of their conceptual knowledge. The cognitive aspects of learning were examined in terms of the domain knowledge covered, as well as the social or affective aspects of learning supported in this community. The teacher discourse was examined by looking at the teacher's presence in terms of modeling scientific discourse, scaffolding learners when misconceptions arose and fading when learners demonstrated their understanding through their text-articulations.

The WebCT postings were coded and analyzed using the "community of inquiry" model (Garrison, Anderson, & Archer, 2000). We chose this framework because it provides tools for examining both teacher and student interactions from both a cognitive and social perspective. However, it does not specifically address each of the cognitive apprenticeship processes but rather provides opportunities for interpreting these discursive patterns from the data. The coding dimensions include *teaching* (Anderson, Rourke, Garrison, & Archer, 2001), *cognitive* (Garrison et. al., 2000) and *social presence* (Rourke, Anderson, Garrison, &

Archer, 1999) (See Figures 1-3). In other words, what does the teacher do, what does the student do, and how do interactions lead to cognitive and social development? Theoretically, their model supports Dewey's (1938) notion that interaction is the most important component of the educational experience in that students are able to transform and give value to the knowledge transmitted to them and convert it into their own personal use. The model serves as an effective methodological tool for studying and evaluating educational experiences using CMC. Other coding schemes would have provided different opportunities for meaning making from the same data (Koschmann, 1999) and with different data analysis options. For example, we could have coded directly for cognitive apprenticeship methods (Lajoie & Berdugo, 2001) or for specific tutor-student interactions and how they resulted in different types of questions asked (Graesser & Person, 1994). We chose to use the communities of learning dimensions because the instructional goals were to foster community building within a CMC and the dimensions cover teacher and student interactions as well as content and quality of questions asked.

Teaching Presence

Teaching presence is defined as "the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes" (Anderson et al., 2001, p. 3). The community inquiry model includes the graduate student in the teaching presence category when certain tasks during the educational process are delegated to, shared with, or assumed by the students (Anderson, 2004). This dimension can provide some insights as to whether there is evidence of modeling and scaffolding in the CMC. It includes three categories: instructional design and organization; facilitating discourse; and direct instruction. *Instructional Design and Organization* refers to the instructor's planning activities. *Facilitating Discourse* refers to the teacher's focused and sustained interventions that foster knowledge building within the community. *Direct Instruction* refers to the teacher providing the conceptual basis and setting the tone of the intellectual environment of the course. Figure 1 provides examples from coded protocols.

Cognitive Presence

This dimension is defined as the development of critical thinking skills by constructing meaning through sustained reflection and discourse in a critical community of inquiry (Garrison et al., 2000). We examine this dimension as it relates to the domain knowledge represented in the course and how the discourse reveals the students' conceptual understanding of that domain and the appropriation of scientific discourse. It includes: triggering events; exploration of ideas;

Category	Codes	Examples
Instructional Design and Organization	1. Setting curriculum	*None*
	2. Designing methods	This year I'm planning an international component to this course...
	3. Establishing time parameters	As details become available I will let you know
	4. Utilizing medium effectively	Try your hand at WebCT and post a message
	5. Establishing etiquette	*None*
Facilitating Discourse	6. Identifying areas of agreement/disagreement	*None*
	7. Seeking to reach consensus/understanding	*None*
	8. Encouraging, acknowledging, or reinforcing students contributions	I am impressed by the quality of the quantity of discussion on this topic
	9. Setting climate for learning	Furthermore it would be great if you could come up with ideas that would give you a reason to talk or form groups with the international partners.
	10. Drawing in participants, prompting discussion	Any ideas?
	11. Assess the efficacy of the process	*None*
Direct Instruction	12. Present content/questions	Take an example from an area of choice, e.g., Match, science, etc, and show me what to do to feed the research literature to teachers in a ped day
	13. Focus the discussion on specific issues	Isn't it possible that practitioners do not get exposed to the latest research literature?
	14. Summarize the discussion	*None*
	15. Confirm understanding through assessment and exploratory feedback	*None*
	16. Diagnose misconceptions	*None*
	17. Inject knowledge from diverse sources, e.g., Textbook, articles, internet, personal experiences (includes pointers to resources)	If really interested in this topic I can provide more guidance with readings.
	18. Responding to technical concerns	*None*

Figure 1. Categories, codes and examples for Teaching Presence Dimension.

Category	Codes	Examples
Triggering Events	1. Recognizing the problem	To whom do scholars ground theories and write the papers?
	2. Sense of puzzlement	While I was listening to you all, I was amazed at how difficult it is for practitioners and researchers to communicate with each other.
Exploration	3. Divergence: within the online community	*None*
	4. Divergence: within a single message	If we accept that curriculum, instruction, and evaluation are all interrelated,...
	5. Information exchange	At that time I thought that no one had done any useful research on practice.
	6. Suggestions for considerations	If professionals must prove that they are up to date in their skills and knowledge, who will pay for the training and when does this training happen?
	7. Brainstorming	In my opinion, the cognitive view of learning comprises most characteristics in the metaphor of information processing model
	8. Leaps to conclusions	Some of the knowledge they test seems downright silly
Integration	9. Convergence: Among group members	The gap between research and practitioners exists in many fields (if not most).
	10. Convergence: Within a single message	It is no wonder that there is a gap between practitioners and researchers
	11. Connecting ideas, synthesis	Many educational researchers seem to be adepts of the latter two.
	12. Creating solutions	I think that it has to come from each school board to find a way with its teacher to keep doing professional development on a regular basis.
Resolution	13. Vicarious application to real world	the problem is one of making that research more available to the everyday, overworked teachers.
	14. Testing solutions	Teachers (as students) would be asked to mimic a class they would potentially teach.
	15. Defending solutions	This way they could get a real life feel

Figure 2. Categories, codes and examples for Cognitive Presence Dimension.

Category	Codes	Examples
Affective	1. Expression of emotions	Have a great week-end
	2. Use of humor	Take a peek next time you find yourself killing time in front of a computer with a high speed connection
	3. Self-disclosure	For example, while I was working as an instructional designer for e-learning in K, I always had doubts and needed more theoretical and empirical
Interactive	4. Continuing a thread	The business aspect of standardized testing is of particular interest …
	5. Quoting from others' messages	I planned to simply broaden the discussion we had in class and came to realise just how large and unresolved these areas are.
	6. Referring explicitly to others's messages	We certainly will not run out of subject to discuss in 3 hours.
	7. Asking questions	Sounds feasible?
	8. Complimenting, expressing appreciation	so thank you for pointing it out
	9. Expressing agreement	I will be checking it out before wrapping up my second thought paper,
	10. Giving information	Here are the questions for next Wednesday.
Cohesive	11. Vocatives	*None,*
	12. Addresses or refers to the group using inclusive pronouns	I'd like to share your experience and possible solutions to such problems in this field
	13. Phatic, salutations	See you in class,

Figure 3. Categories, codes and examples for Social Presence Dimension.

integration; and resolution. The codes in this category include socio-cognitive characteristics of critical thinking.

Social Presence

This dimension pertains to the social and/or affective remarks that appear in the discourse. Garrison et al. (2000) argue that the cognitive presence dimension is enhanced and sustained by establishing socio-emotional interaction within the groups. Social presence refers to the development of a supportive environment in which participants feel comfortable enough to publicly share and express their ideas within a collaborative context (Anderson, 2004).

Procedure

Both schools selected protocols that best reflected their classroom context in terms of the richness of their respective CMC discussions. At McGill, two distinctive threads were analyzed, one on the topic of professional development and the second one on the topic of situative versus traditional cognitive theories. At UNAM, one session was analyzed that occurred later in the semester. The topic was writing and reading competence. Each posting was segmented by idea units, which were then used as the unit of analysis. An idea unit was defined as any part in the discourse, i.e., phrase(s) or sentence(s) that conveyed a complete idea. We coded the segments based on the three different dimensions embedded in each message. The examples demonstrate that different idea units reflect the different dimensions (coding categories and subcodes). As Chi stated, the defining cut for verbal data depends on the amount of information that one wants to derive from the data. The smaller grain size allowed the analyses of the interactions that occurred around questions discussed in the FF encounters and issues that were pursued after in-classroom discussion. The postings consisted of two activities: the free discussions on WebCT and the compulsory postings of the discussion questions. The free discussions were coded based on the dimensions identified above. In both locations, two research assistants coded the data independently.

The student-generated discussion questions (compulsory questions) were viewed as a form of knowledge articulation in that the question itself requires students to analyze and critically review the theories and research they are reading prior to question production. The compulsory discussion questions posted by the students were considered products of student's understanding of the reading materials as well as representing what students' expected from their peers. Thus, they were coded and segmented differently than the free discussion. For instance, a question might be geared for peers to agree, analyze, compare, describe, etc. (see Table 1).

Table 1. Coding Scheme for Compulsory Discussion Questions

Codes (Indicators)
AGREEMENT. A question that specifically asks for agreement or disagreement. Ex.: Do you agree with Deanna Khun's hypothesis?
ANALYSIS. Includes transfer of knowledge and/or application. Ex.: Should responsibility be shared equally to ensure accountability. . .?
ASSESSMENT. A question that expects evidence of evaluation. Ex.: How does Schoenfeld relate science and theory to practice?
CAUSE & EFFECT. Ex.: Do you think the standards will have a positive or negative effect on . . . ?
COMPARISON. Making comparisons/distinctions between different issues/topics. Ex.: According to . . . what are the three views . . . ?
EXPLANATION. A question asking for explanation, definition, description of an idea or concept, or synthesis of concept or idea. Ex.: What is scientific inquiry? How do you define it within your own scientific practices?
EXAMINATION (illustration). Asking for discussion of an idea or concept. Ex.: Discuss the relationship between cognitive tools and scientific reasoning described in….

RESULTS

Data Analysis

The McGill results are based on the analysis of 58 messages that were segmented into 602 segments. A graduate student who volunteered to serve as a second rater for the purpose of assessing the inter-rater reliability index coded 225 segments from the professional development thread (37% of the total data set). The index obtained by calculating the percentage of agreement between raters was 75.30 % (teaching dimension 78.95, cognitive dimension 68.10, social dimension 95.06). At UNAM there were 49 messages and 550 Segments. The graduate student who volunteered to serve as a second rater coded the entire data set. The reliability index at UNAM was 77.42 % (teaching dimension 87.80, cognitive dimension 76.98, social dimension 67.50). Garrison et al. (2001) reported similar

Table 2. Frequency and Percentages of Coding Categories and Compulsory Questions

	McGill University		UNAM	
	Frequency	Percentage	Frequency	Percentage
Teaching Presence Codes				
Instructional Design & Organization	39	68.40		
Facilitating Discourse	10	17.54	12	30.77
Direct Instruction	8	14.03	27	69.23
Total Number of Segments Coded	57		39	
Cognitive Presence Codes				
Triggering Event	36	11.84	50	14.25
Exploration	121	39.80	187	53.27
Integration	93	30.60	97	27.63
Resolution	54	17.76	17	4.85
Total Number of Segments Coded	304		351	
Social Presence Codes				
Affective	38	25.50	11	31.43
Interactive	65	43.62	17	48.57
Cohesive	46	30.87	7	20.00
Total Number of Segments Coded	149		35	
Compulsory Questions Codes				
Agreement	6	5.04	4	3.20
Analysis	26	21.84	13	10.40
Assessment	15	12.60	26	20.80
Cause & effect	4	3.36	4	3.20
Comparison	9	7.56	13	10.40
Explanation	12	10.08	44	35.20
Examination (illustration)	47	39.50	21	16.80
Total Number of Segments Coded	112		125	

indices, arguing that reliability levels in this range are acceptable for new coding systems with strong analytical weight. There were some instances of dual coding. Frequency counts for each code are listed in Table 2. The descriptive analysis of the free discussions and of the compulsory questions is described below.

Free Discussions

Teacher presence reveals that the McGill instructor spent most of her time online establishing the instructional design and organization of the course (68%). Evidence of the instructor facilitating (18%) and directing instruction (14%) is present. In a cognitive apprenticeship model the instructor scaffolds learners by facilitating the discourse and through direct instruction but also fades such

assistance when the community indicates that scaffolding is no longer needed. Although we did not have enough data to examine differences in type and frequency of teacher interventions over time, the percentages demonstrate a high functioning scientific community in that the teacher does not dominate the discourse. At UNAM, instructional design and organization were not evident in the online forum since these issues were discussed in the classroom. The UNAM instructor spent more time giving direct instruction (69.23%) than facilitating discourse (30.77%). The subcategories reveal that the instructor focused the discussion on specific issues, summarized the discussion, and confirmed understanding through assessment and explanatory feedback.

The cognitive presence codes suggest the level of conceptual development. At McGill, much of the discourse was dedicated to exploring topics (39.8%) and integrating knowledge (30.6%) (see Table 2). The exploration category speaks to the students' quest to reach an understanding of information. In the integration stage, students converged on their ideas, connected the dots and created solutions to their questions. Together, these results indicate that differences were discussed and convergence of ideas was reached by integrating the perspectives of others. Given that these online discussions took place after the FF meetings, it indicates a quest to reach closure on these topics and continued engagement. At UNAM, the most dominant interaction patterns occurred around exploration (53.27%) and integration (27.63%). However, UNAM students did not reach satisfactory resolution levels (4.85%) to test or defend solutions. Given that these discussions took place prior to the FF meetings, these results might indicate that students are trying to understand and explore the questions rather than to integrate knowledge. The instructor prompted exploration by presenting background information and suggesting alternatives before attempting integration or resolution of ideas. The instructor used a modeling and scaffolding strategy to promote learning by facilitating the connection of ideas, synthesis and creating solutions, before moving to resolutions.

In terms of social presence, the McGill discourse was largely interactive (43.62%), followed by cohesive (30.87%) and affective (25.5%). These data suggest a cohesive group of students who built on each other's thinking by recognizing their ideas as valid and expanding on those ideas. Along with indicators of positive affect the social interaction was dedicated to continuing the development of knowledge. On the other hand, UNAM data showed that the majority of the discourse fell under interactive (48.57%) and affective categories (31.43%) and less on cohesive (20.00%). Although UNAM was similar to McGill in that the discourse was highly interactive, the UNAM students scored higher on affective codes but lower presence of cohesion. A comfortable learning climate was indicated but there was less evidence of support for each other's ideas.

The analyses of the compulsory discussion questions showed that the majority of McGill student questions were designed with the purpose of having peers examine (39.5%) and analyze ideas, concepts, and perspectives (21.84%). At

UNAM, students generated questions that required explanations of the concepts and ideas (35.2 %) and assessment of ideas (20.8%). Both groups demonstrated a high level of critical thinking.

The Global Experience

The global experience consisted of a shared global forum and a shared videoconference of student experiences. The former was less successful than the later. The language barrier prevented easy partnering between students. However, there were attempts by UNAM to get the gist of the McGill dialogue and translate and integrate the concepts locally. The videoconference was successful because the presentations were translated simultaneously. The theme was "Creating electronic zones of proximal development for graduate instruction." A selection of student paper titles were: *Towards the creation of a community of practice; Self-Regulation in on-line communities of learning; Conceptualizing international graduate education using zones of proximal development; Assessing innovative practice.* The conference stimulated CMC data which we did not analyze for this article since it was directed at each group preparing for their own presentation. However, student engagement continued post conference as students made suggestions for the future. One student reflects upon the role of experts and novices in an extended online community:

> Any learning community is limited by the combined knowledge of its members. This is a key benefit to the online collaboration and video conference. Combining these classes creates a larger community than any one class alone, thus also creates more combined knowledge than any one class alone. Schools are not islands. They exist in wider communities and we rely on them. Students emerge as experts. The "expert role" can be taken on by the students within WebCT. . . .

Other students contributed to the ongoing dialogue supporting future international collaborations as well.

GENERAL DISCUSSION

The research described in this article addresses online interactions—between teachers and students and between students and students—in two graduate seminars separated by distance and language. These classrooms shared course content and discourse through CMC and a videoconference at the end of semester that consisted of theme-based student papers and discussions. An exploratory analysis of how CMC facilitated instruction was conducted. A common methodological framework was used to look for evidence of teacher, cognitive, and social presence as indicators of mentoring and scaffolding, types of knowledge that emerged, and the type of social environment that this technology supported.

Although we anticipated language barriers between students in two countries, we did not anticipate differences in the access to technology or familiarity with CMC in seminars. However, we found that the UNAM students did not have the same familiarity with Web-based conferencing facilities and, consequently, the instructional context for the introduction of the CMC in the two seminars differed.

The McGill students had prior experience using WebCT and hence the introduction of technology was somewhat seamless. The instructor was able to use the same approach in her online instruction as she did in her FF sessions. Her approach consisted of modeling the type of discourse that she expected her students to adopt, scaffolding them when needed and fading such assistance once students demonstrated proficiency. The McGill instructor used the forum mostly to discuss instructional design and organization of the course content, some time facilitating discourse and less time directly instructing students. In contrast, the UNAM instructor spent more time giving direct instruction due to the different instructional context. The teacher presence codes reveal that the UNAM instructor facilitated the discourse through her interventions to ensure that students could effectively use the technology as well as understand the course content. In terms of course content, the teacher directed the content of the discourse to strictly chosen topics each week, rather than a free-format where students could choose to discuss whatever interested them.

The type of knowledge discussed online was analyzed using the cognitive presence codes. Over 70% of the McGill discourse and 84% of the UNAM discourse pertained to exploring concepts and integrating knowledge. At McGill the cognitive dimension was highly tied to the social presence category which showed that students were highly interactive and cohesive, promoting the extension of knowledge, building on one another's ideas rather than ignoring or rejecting newly introduced ideas. At UNAM, the instructor modeled consideration of ideas prior to posing solutions to problems. The social presence dimension illustrated that the UNAM students were highly interactive and affective, setting a comfortable climate for discussion. However, they were less cohesive than their McGill counterparts. This finding could be attributed to the instructional context whereby UNAM students used the forum prior to their face-to-face meetings and could have still been struggling with interpretations, whereas McGill continued the dialogue after the face-to-face meetings, having time to connect to one-another's ideas.

The cognitive presence dimension is congruent with the analysis of the compulsory discussion questions. The compulsory discussions suggested that McGill students incite each other to consider higher levels of examination of concepts through concrete illustrations as well as high levels of analysis between new concepts. The examination category fosters divergent thinking whereas analysis requires convergent thinking. Together these two categories suggest a high level of conceptual understanding. The majority of questions were aimed at promoting the examination of readings by discussing relations between concepts, providing illustrations of understanding, and demanding an analysis of knowledge

and how it would transfer to new situations. At UNAM students asked their peers for explanations of the readings and assessments of their understanding as well as comparisons and analysis of ideas.

Future Considerations

Our goal was to explore how CMC could be used and shared in graduate seminars to foster student engagement in scientific discourse about research in the area of cognition and instruction. We were successful at demonstrating how technology can be incorporated into higher education classrooms and how a "community of inquiry" model, with its teaching, cognitive, and social presence dimensions, could be used to observe instructional models and the type of interactions that demonstrated conceptual understanding. The exploratory nature of this work demonstrates the difficulties in crossing linguistic barriers as well as cultural differences. By cultural differences we refer to the culture of the classroom located in different countries rather than Canadian-Mexican cultural differences.

The findings can inform future work in the design of online joint-classroom activities as well as the analysis of online communications in terms of teacher-student interactions and student-student interactions. Whereas the cognitive presence dimension and the compulsory discussion analyses provided us with some idea of the conceptual reasoning that took place in the classroom, future research will more explicitly address the amount of overlap in content knowledge demonstrated in the two classrooms. Furthermore, we would like to examine how teacher-student interactions changed over the course of the semester. We would anticipate that teachers prime the discussion early on in the forum, and fade when there is evidence of student-driven questions and observations. Empirical work is needed to support this assumption. We would continue to use the international videoconference as a tool for knowledge sharing at the end of the semester. The videoconference provided a reason for collaboration, a real audience, with whom students and professors could engage in high-level discourse that resulted from their semester together. Nevertheless, future research must find an authentic reason for students to collaborate earlier in the semester as a way to promote cross talk between communities of learning and to have a valid shared context for teaching and learning. We intend to reach beyond the local context and foster a larger international community of practice early on in graduate instruction despite language and technology access. Future collaborations will foster the joint production of projects between students in both countries.

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