



January 2008

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Approaches to case analyses in synchronous and asynchronous environments

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Computer-mediated communication (CMC) tools can be used to integrate time-intensive tasks, such as case study analyses, more easily into formal learning environments. How students talk together online in CMC environments is an area that has not yet been thoroughly investigated. This paper extends findings from a previous study by comparing two groups of preservice teachers analyzing cases in a synchronous and asynchronous environment. A case study and computer-mediated discourse analysis approach was taken to make sense of the discussion transcripts and student reflections. Booth and Hulten's (2003) taxonomy of learning contributions is used as an analysis framework. Students made more participatory moves to establish presence in asynchronous environments and more interactive moves in synchronous environments. Reflective contributions were made in both environments, with few learning moves made in either. Students participated asymmetrically in both modes. The interplay between types of contributions, affordances of each mode, student preferences and student epistemological beliefs is explored, with implications for the design and analysis of case discussion tasks in CMC environments.

doi:10.1111/j.1083-6101.2008.00405.x

Introduction

Case-based teaching and learning provides the opportunity for preservice teachers to analyze and reflect upon classroom situations. This study examines preservice teachers' use of computer-mediated communication tools (CMC) as a means for discussing cases in an applied educational psychology course. In a previously published study (Authors, 2006), we examined two groups' discussions as they completed a case analysis task using Blackboard's asynchronous forum. While our purpose for

case-based teaching and learning was for students to generate new ideas and knowledge together through dialogue, not much of this occurred. Instead the participants maintained an epistemological stance of knowledge acquisition – seeking to find the ‘right’ answer rather than jointly creating meaning together. We hypothesized that this may have been the case because it was the first time the groups had worked together. Trust, a clear purpose for the task, and effective discussion prompts have all been identified by Hough, Smithey and Evertson (2004) as keys to an effective online group experience.

We wondered whether a synchronous environment may be better suited for joint meaning making. As the instructor and graduate assistant for the course, we made adjustments to the design of the second case analysis task based on our findings. We examined the discussions of the same two groups as they completed the second task in a text-based chat environment. Like Whipp (2003), we systematically investigated what happened as we modified the design of our case-based teaching to encourage collaborative dialogue. Rather than attempt to narrow down instructional variables in search of *one* particular cause for any learning outcomes, we acknowledge that learning environments are complex, and that *any* change may impact outcomes. In the tradition of qualitative inquiry, we document our design decisions and outcomes, describing and interpreting what happened from our stance as researchers and instructors.

Review of the Literature

Cases are continuing to garner interest as a way to prepare preservice teachers for real-world teaching environments (Carter, 1989; Floyd & Bodur, 2005; Pindiprolu, Peterson, Rule, & Lignugaris/Kraft, 2003; Sudzina, 1999a). Teacher educators are finding the case method of instruction useful for improving preservice teachers’ problem-solving and decision-making skills (Floyd & Bodur, 2005; Snyder & McWilliam, 1999; Sudzina, 2000; Wood & Nahmias, 2005). We define a case as a “story, event, or text [that] is an instance of a larger class, an example of a broader category . . . which merits more serious consideration than a simple anecdote or vignette” (Shulman, 1992, p. 17). Case-based pedagogy provides an opportunity for preservice teachers to engage in a narrative way of knowing by encouraging reinterpretation and multiple representations of teaching and learning events within the specific context of a case (Shulman, 1992). Carter (1989) posits that using cases can benefit novice teachers by engaging new teachers in reflection and analysis.

The discussions that occur are integral to the case analysis process (Rourke and Anderson, 2002; Shulman, 1992). Inquiry into how people talk together to complete tasks in learning environments is grounded in social constructivist and sociocultural theories of learning. Social constructivism emphasizes the negotiation of meaning and construction of shared understanding through dialogue. From this stance, dialogue becomes the focal point for understanding learning. Stahl’s (2006) social theory of learning positions learning not as a knowledge-transmission process but

rather a knowledge-creation process, in which knowledge is created through conversation. Stahl argues that individual knowing is in essence an interpretation of the meaning that is first made while in communication with others. He points out that when small groups are working together they must “make their learning visible” by talking to each other.

There are several obstacles to implementing discussion-based instructional methods such as case analysis. These include the significant time needed for discussion (Carter, 1989; Gideonse, 1999; Sudzina, 1999b), a lack of physical space conducive to such discussions (Carter, 1989; Gideonse, 1999), and the challenge of facilitating multiple discussions simultaneously (Gideonse, 1999). Using CMC tools is one way to overcome these obstacles. Asynchronous discussion boards eliminate space and time constraints required by face-to-face environments. Synchronous chat environments provide place-independent opportunities for conversation, but they are not time-independent as everyone must be logged in at the same time. Both types of transcripts can be archived for later review. CMC can also support active participation by more students.

A growing body of research has examined online discussions in educational environments, including teacher education courses. Fauske and Wade (2003-2004) found approximately equal participation levels among graduate students in an asynchronous discussion forum. Slavit (2002), examining asynchronous discussions among the 40 preservice teachers in his math methods course, found that students who would not normally participate in the classroom did so more frequently online. Stephens and Hartmann (2004), however, found that their attempts to use a voluntary asynchronous discussion forum with preservice teachers in the field resulted in little to no participation. Lack of explicit requirements for participation can result in little to no discussion. Hew and Cheung (2003a, b) also found little participation or deep cognitive processing by students during one week of online case study discussion among a group of sixteen preservice teachers. However, few details are provided about the nature of the task, and the authors note that students weren't given much structure or guidance.

The quality of conversations have been researched more in asynchronous than synchronous environments. Angeli, Valanides and Bonk (2003) studied a relatively large number ($n = 146$) of preservice teachers as they participated in case analysis in asynchronous forum. Students did not value the experience nor did they go beyond surface-level discussion. Angeli et al. questioned whether deep, meaningful discussions are even possible in asynchronous environments. Yet their online discussions were open-ended rather than goal-oriented, with little incentive for deep discussion. The large number of participants may also have limited the depth of the discourse.

Im and Lee (2003–2004) compared synchronous and asynchronous conversations among 40 preservice teachers. They reported that synchronous environments are better suited for socializing and asynchronous ones for serious discussion. They claimed that synchronous communication does not result in “academic” discussions, but the nature of the task is not included in the study. Also, the online

discussions were encouraged but not required as part of the course. Pena-Shaff, Martin, and Gray (2001) examined discussions of graduate students engaged in open-ended discussions and found the students were more interactive, participated more equally and socialized in the chat environments, whereas in the asynchronous environments they posted opinions but engaged in little to no interaction. They claim that asynchronous is better for critical thinking and reflection, with chat a better tool for idea-generation and feedback.

Analytic Framework

Researchers investigating online discussions should utilize frameworks that build on prior research (Rourke & Anderson 2001a, 2004.) We build upon Booth and Hulten (2003), who used a phenomenographic approach to understand where the learning is occurring in asynchronous dialogue. They examined two groups of engineering students as they completed a design task.

Booth and Hulten (2003) created a taxonomy of necessary, though not sufficient, contributions to discussions which open a “dimension of variation” to afford an opportunity for learning. They describe “variation” as an essential aspect of learning in that “things are seen in distinctly new ways when a dimension of variation opens around a phenomenon or aspect of a phenomenon that once was taken-for-granted . . . Lack of understanding is linked with being unaware of the potential for variation – seeing only that which is taken-for-granted” (pp. 69–70). The most educationally productive conversations, then, are ones that open a dimension of variation which provide an opportunity for learning to occur.

Booth and Hulten (2003) identify four types of contributions to such conversations and through their analysis identify speech acts associated with each type of contribution. *Participatory* contributions are those which acknowledge the presence of others (similar to the idea of social presence, e.g. Rourke, Anderson, Garrison & Archer, 2001b) and include speech acts such as addressing group members by name, referring to another’s post, acknowledging each other’s contributions, and encouraging each other. *Factual* contributions are those which refer to the problem being discussed. Some factual speech acts include state, propose, elaborate, extend, explain, and ask. *Reflective* contributions consider the problem situation from a new angle by questioning what has been said through speech acts of agreeing, disagreeing, comparing, isolating a detail, or problematizing. Finally, *learning* contributions “appear as the culmination of two or more threads of parallel or even conflicting lines of argument, and continue with a clearer goal to the argument or with a concrete outcome such as a refined speculation” (p. 81). Learning contributions may include speech acts such as discerning, refining, and opening a dimension of variation. However, Booth and Hulten emphasize that such acts are really only identifiable in context.

We extend Booth and Hulten’s work by looking at a synchronous discussion. Participants have been found to contribute more equally to synchronous conversations (Pena-Shaef, Martin & Gray 2001). Asynchronous discussions are

often time-consuming to read, often with much lag time, making it difficult for participants to remain engaged (Levin, He & Robbins, 2004; Rourke & Anderson, 2002). Chat has been seen as more social and interactive than asynchronous environments (Im & Lee, 2003-2004; Ingram, Hathorn, & Evans, 2000; Pena-Shaef et al., 2001, Davidson-Shivers, Muilenberg & Tanner, 2001). Levin, He and Robbins (2006) found higher levels of critical reflection in the tasks which were completed after small groups of preservice teachers discussed the cases synchronously. They did not analyze the discussion transcripts, however. Our study adds to the literature by examining the case analysis discussions that took place in both synchronous and asynchronous environments. A better understanding of how groups of preservice teachers analyze cases in CMC environments can help teacher educators decide how best to structure such tasks. Specific questions are:

RQ1: How do participants approach the case analysis task in the synchronous environment?

RQ2: What are the levels of individual participation in the asynchronous and synchronous environments?

RQ3: What types of contributions and functional moves are exchanged in asynchronous and synchronous environments?

Context of the Study

All 31 pre-service teachers in a required educational psychology course at a southeastern university were randomly assigned to groups of four to complete three case analyses over the course of a fifteen week semester. The instructor selected the cases from the online casebook component of the textbook available at the companion Website. The textbook used was *Educational Psychology: Windows on Classrooms* (Eggen & Kauchak, 2004). The textbook opens each chapter with a case, and these were read by students as part of the foundational material discussed in class.

One course goal was for the preservice teachers to develop a comfort with and understanding of educational applications of CMC tools. Blackboard was used to communicate with students throughout the course. Blackboard's discussion forum was used for the first case, and its text-based chat environment for the second case. Groups met in private chat rooms and used the archive feature to save their discussion. Groups were allowed to choose which of the two modes they wanted to use for the third case analysis.

Participants stayed in the same groups throughout the semester. Groups self-facilitated and no roles were assigned. The instructor was available to answer questions, and technical support was available from a graduate assistant. At the end of the one week period the groups synthesized their discussion, wrote individual reflections on the experience, and submitted both items to the instructor for assessment.

Our preparation of the students for the second case analysis was informed by our earlier findings. We followed our four recommendations by: designing the task to

foster collaboration, cultivating trust among the group, fostering an epistemological stance of knowledge construction rather than transmission, and encouraging dialogue for learning. First, we made the case more complex so that it could not neatly be divided among the group members for individual completion, as had happened in the first case analysis. The case study illustrated a teacher presenting a lesson using guided discovery and handling a student's misbehavior. The guiding questions asked students to analyze the teachers' effectiveness, identify principles used to guide the teachers' actions, and consider what the teachers could have done differently. Students were asked to provide a rationale for their responses and evidence from the readings.

We kept students in the same groups, hoping that their previous experience with each other would foster trust. We took time during class to debrief with the students on their first case analysis experience and to read the second case together. We talked as a class about different epistemological stances and our belief that there was not one "right way" to analyze the case. We explained the expected outcomes for the analysis, which was that the groups would engage in dialogue and construct new knowledge together. We modeled and encouraged this type of dialogue, such as eliciting and exploring various alternatives, rather than immediately focusing on identifying the "one correct answer." In addition to the class discussion we provided written guidelines which explained the rationale for the case analysis task, how it would be assessed and some suggestions for approaching the analysis (see Appendix A).

Method

A descriptive case study approach (Merriam, 1998) was selected as the organizational structure for our inquiry into what happened in the two groups. Lincoln and Guba (1985) assert that the case study is the reporting mode of choice for naturalistic inquiry. Naturalistic case study research emphasizes a focus on meaning in context and is an "ideal design for understanding and interpreting observations of educational phenomenon" (Merriam, 1998, p. 2). This approach is best when description and explanation are sought rather than prediction (Merriam, 1998). It answers questions about "how" and "why" educational phenomena occur (Yin, 2003). Rather than comparing the effectiveness of each environment, we seek to understand how the students completed the two case studies, providing a thick description and interpretation of what happened.

We used maximum variation sampling (Merriam, 1998; Glaser & Strauss, 1967). We chose two groups with the maximum variation in their performance on the first case analysis. Group M was the most successful and Group L was least successful based on the grade received on their synthesis papers. We chose to look at the same two groups' second case analysis to see how the conversations were different, if at all. Table 1 outlines the participants of the two groups, whose names have been replaced with pseudonyms.

Table 1 Participants

Group M	Group L
Jean	Eddie
Mary	Julie
Robert	Deborah
Ann	Angie

Hmelo-Silver (2003) suggests that “mixed methods are necessary to construct a good understanding of collaborative interactions, otherwise there is a risk of being overly reductionistic” (p. 397). She goes on to suggest that

a fine-grained line-by-line coding allows the researcher to examine an entire corpus of discourse to identify important and representative cognitive and social processes that can be reported as frequency counts . . . further qualitative analysis can be used to investigate larger phenomena that occur over greater units of time . . . these techniques permit more comprehensive investigation than any single technique (p. 399–400).

Wells and Arauz (2006) also take a qualitative and quantitative approach to understanding the dialogue among teachers and students in their study, coding utterances to show how conversations developed and qualitatively exploring the context of the conversations. We follow in this tradition by taking a mixed-methods approach to the analysis.

Data included discussion transcripts and individual reflection papers. Participant reflections were read for themes related to the research questions and used to triangulate findings from each phase of the transcript analysis. A thick description illustrates how each group approached the task. A computer-mediated discourse analysis approach (Herring, 2004; Paulus, 2004) was adopted for close analysis of the transcripts. First, each message was segmented into its various functions. Unitizing is a necessary step because individual messages contain multiple functions. The notion that we *do* things with our words can be traced back to speech act theory (Austin, 1962; Searle, 1969). Speech act theory is particularly useful when seeking to examine how groups complete a *process*. Messages were unitized to capture how each unit was contributing to the conversation. Table 2 illustrates an example of unitization.

Previous studies of online discussions vary in how they label these units of analysis: speech acts (Booth & Hulten, 2003), utterance units (Condon & Čech, 2001, Condon & Čech, 1996), illocutionary acts (Howell-Richardson & Mellar, 1996), macrosegments (Longacre, 1992; Herring, 1996) and functional moves (Francis & Hunston, 1992; Kruempel, 2000). We chose the label of functional move to emphasize that the unit is one *move* in an ongoing conversation that serves a particular *function* in the discourse. Although Henri and Rigault (1996) choose to label their units speech segments, their definition is most similar to ours: “the

Table 2 illustrates an example of unitization.

Message from Julie in Group L	Functional Move
yeah,	Acknowledge
she seemed to have an immediate and specific lesson and got lots of interaction from the class.	Extend
They obviously were getting at what she was trying to get them to see	Claim

smallest unit of delivery, linked to a single theme, directed at the same interlocutor, identified by a single type, having a single function” (p. 62).

The number of functional moves exchanged by each participant was calculated to describe participation levels. Next, each move was coded and counted according to the four types of contributions identified by Booth and Hulten (2003) (participatory, factual, reflective and learning). Finally, the types of functional moves within each category were further operationalized to get a better sense of what each category looks like in context. The functional moves identified in our earlier study were the starting point for our analysis. We were open to finding new categories and modified the coding scheme accordingly. The final categories are presented in detail in Appendix B. We compared the findings from the asynchronous discussions during the first case analysis with the synchronous discussions from the second case analysis.

Our coding process occurred as follows. First we reviewed the task assignment and the transcripts in their entirety in order to fully understand the context. We both analyzed the entire data set to lend trustworthiness to the analysis (LeCompte & Goetz, 1982; Lincoln & Guba, 1986). We first coded the functional moves independently and then compared our findings. When disagreement occurred, we negotiated to reach a final decision, at times creating a new category, combining categories, or refining an existing category.

Several methods were used to establish trustworthiness (also known as internal validity), dependability (consistency) and the overall rigor of this study (Lincoln & Guba, 1986; LeCompte & Goetz, 1982; Merriam, 1998). We had prolonged engagement with the study site. We were immersed in the data over a long period of time. We kept a record of our meetings and maintained an audit trail of our data collection and analysis process. During regular meetings we engaged in peer debriefing on every stage of our analysis. As Lincoln and Guba (1986) suggest, we use thick, rich description so that readers may decide on the degree of congruence and applicability of our working hypothesis to their own teaching and learning environments.

Findings

Finding #1. Overall approach to the case analysis

We first provide a thick description of what happened during each group’s chat.

Group M. Group M’s discussion lasted a little over 50 minutes. All group members participated by formally asking each other questions with the exception of Robert, who did not participate in the discussion for about 8 minutes due to technical

difficulties. The group members took turns asking questions until Mary asked, “So are we done?” and Jean asked, “Does anyone else have anything else they would like to add?” Mary and Ann agreed that the group was finished and they briefly discussed the procedure for submitting their summary. This portion of the chat lasted approximately three minutes.

Group M reported in their reflections that they prepared for the discussion by meeting in class to determine time for their session and to decide who would be responsible for archiving the chat and preparing the summary. Prior to the chat, individual group members read the case and looked for answers to the case questions in their textbooks. Group members referred to specific pages in their textbook throughout the chat as illustrated in the following examples:

Mary: “maybe if she explained to the students how learning about this topic would benefit them they might become more motivated...i think that’s from chapter 10”

Ann: “she obviously cared about the students and whether they learned, she also had enthusiasm when teaching the subject matter. Ch. 11”

The group seemed well organized, although it was not clear if they determined in advance who would pose the questions. The group stayed on task and interacted in a congenial manner. Several times throughout the conversation participants used the smiley face (☺) emoticon and made statements such as “heehee” and “haha”. They thanked one another for answers to questions and teased each other when they misspoke:

Jean: Oops, I think transfer is in Ch. 9.

Mary: that’s ok. we just now know not to take what you say seriously cause you obviously don’t know what you are talking about!:-)

Jean: :-)

This perhaps indicates that group members felt comfortable with one another and were not concerned that joking comments could be interpreted as criticisms.

In spite of the comfort and sense of humor that Group M demonstrated in the chat, they encountered difficulties. Participants reported several technical difficulties. Jean shared, “The first time we all decided to meet Mary and I were the only two that could get on . . . we waited for an hour to see if they would join . . . The second time we all got in but one of the group members [Robert] kept getting kicked out . . . I say, chat stinks.” The group also did not like the inconvenience being logged in at the same time. Ann explained in her reflection, “Not having the Internet at home, I don’t like the fact that we all have to be on the computer at the same time. It’s really hard to have 4 people at a computer at the same time when we all have different schedules.”

Group M also did not like needing to fight for the conversational floor. Mary expressed during the chat, “i am behind every time i answer!”, adding in her reflection, “The chat was ok but it was hard to keep track of what everyone was saying. We were all typing at the same time.” Jean added:

If you have ever experienced instant messenger you will understand what I mean when I say.... I was thinking of a thought and typing it but, as I was typing it someone else said it first. Or when you are trying to make a contribution to a question and someone else posts a new question the same time you are still answering. It is like you are competing for time and carrying on two or three conversations at the same time.

Group M ultimately returned to the asynchronous modality for the third case analysis task. Ann reflected:

With the first and final case study, we used the discussion board, which I preferred to use. It allowed me to reflect what everybody else had written about the questions. I did not have to quickly answer questions or respond to questions like in the chat. I could look up information in the book that I thought backed up my answers and theirs.

Mary Added:

We used the discussion board instead of the chat tool because it was easier to communicate through . . . Since we had already done the first case study with the discussion board and it worked fine we decided to do it that way again.

Thus the technical difficulties, need to be logged in at the same time, and incoherent conversations were drawbacks that Group M felt could be overcome by returning to the discussion forum.

Group L. Similar to Group M, Group L prepared by deciding when to meet and allocating responsibilities. Unlike Group M, Group L members described a process of creating and circulating a first draft of the synthesis of their chat, with each member making changes and additions. Group L spent a little over 32 minutes discussing the case, in contrast with Group M's 50 minutes. Also in contrast to the formal question asking of Group M, Julie opened the discussion by simply asking "So what did you guys think of the first case study?" Group members discussed their ideas about the first case with a relatively equal participation level. Eddie eventually asked one of the formal questions from the guidelines, "What could Mrs. Lori have done better?" After some discussion Angie asked, "do you all have anything else?" The others agreed that they had sufficiently "covered" the case.

Group L also referred to the textbook, although not as often as Group M. Group L also stayed on task. While Group L acknowledged and agreed with each other as evidenced by statements like, "I agree with you Julie", "good point Angie" and "That is true," they did not use emoticons or tease one another during the discussion as Group M did. This may account for that fact the Group M chatted for 18 minutes longer than Group L. Group L had some technical difficulties, but these did not seem as serious as in Group M. Angie reflected: "My keyboard was jammed for the majority of the chat. It was extremely frustrating because I would try to type a comment about what a group member had said and everything was delayed . . . I was always one step behind on my remarks."

Deborah pointed out that, similar Group M, she “found it to be very difficult to keep up with the flow, due to the other group members moving ahead to a different topic too soon, or not being able to type what I wanted to say fast enough.” Angie also admitted:

Although, I [found] the case study to be an improvement from the previous, the one thing that hindered my learning was everyone simultaneously responding to one another’s statement and then simultaneously typing. It left some dead time on the computer when all four participants were typing and you did not know if you should wait to continue talking about the concept at hand or move on to the next.

Ultimately Julie and Angie in Group L enjoyed the chat more than the forum. Julie explained, “I prefer the immediate feedback that chatting simultaneously provides. While it can be difficult to find time when each group member can meet, I would like for the third case study to be conducted in the same fashion.” However, Eddie and Deborah did not like the chat as well. Regardless, Group L chose to use the chat for the third case analysis. Deborah reported, “Our group agreed on the chat method unanimously, as we all preferred the immediate feedback.” However Eddie did not agree:

Deciding on a time is not easy when there are four people all of whom are full time student, part time workers, and have families. Comparing the two methods I would prefer the first case study method because while it was tedious to check the discussion board everyday, it was easier then trying to get all the group members together at the same time.

Both groups identified similar drawbacks to the chat environment, yet Group L returned to chat for the third case analysis. One factor could have been that they received a higher grade in the synchronous environment.

Finding #2. Individual Participation

During the asynchronous discussion Group M exchanged 93 functional moves and 251 functional moves in the synchronous chat. During the initial asynchronous case discussion Robert contributed over a third of the functional moves (35) and Ann contributed only 13% (12 functional moves). Both Jean and Mary contributed approximately 25% of the functional moves (22 and 24 moves respectively.) During the synchronous discussion Jean contributed about a third of the moves (84), while Robert posted only 16% (39 moves). Robert’s lower participation in the second chat was due to technical difficulties. Otherwise individuals participated at similar levels in both modes. Jean and Mary also contributed roughly one third of the moves in the synchronous discussion (84 and 76 moves respectively.)

Group L exchanged 31 moves in the asynchronous environment and 172 functional moves in the synchronous environment. In both cases, Julie contributed about a third of the moves (11 asynchronous and 60 synchronous). Angie contributed six asynchronous moves (19%) and 36 synchronous moves (21%). Eddie’s participation was noticeably different in the two modes, as was Deborah’s. Eddie participated

more in the synchronous mode (43 moves, about a quarter of the functional moves made by the group) than in the asynchronous forum (six moves or 19% of the total). Deborah participated more in the asynchronous discussion (eight moves, or about a quarter of the total) than the synchronous mode (33 moves or 19% of the total). Deborah commented in her reflection that she “found it to be very difficult to keep up with the flow, due to the other group members moving ahead to a different topic too soon, or not being able to type what I wanted to say fast enough.”

Finding #3. Type of contribution

Figure 1 illustrates the percentage of each type of functional move exchanged by the groups in the asynchronous and synchronous environments.

Both groups exchanged mostly participatory contributions in the asynchronous environment, with over half of the moves being participatory. Participatory moves are used to establish an individual’s presence in the group. In the synchronous environment roughly half of both groups’ moves were factual contributions. Group L had only 16% of their contributions in each mode coded as reflective, while nearly a quarter of Group M’s contributions in chat were reflective with only 12% of reflective moves in the forum.

a. Participatory

Figure 2 compares how the groups used specific functional moves to make participatory contributions to the conversations in each CMC mode.

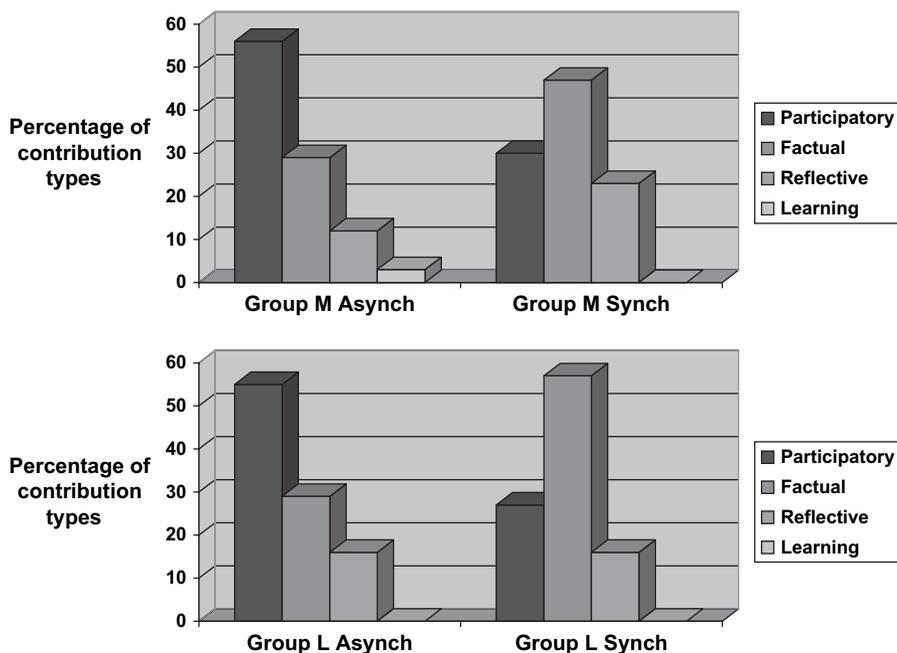


Figure 1 Contribution types by environment.

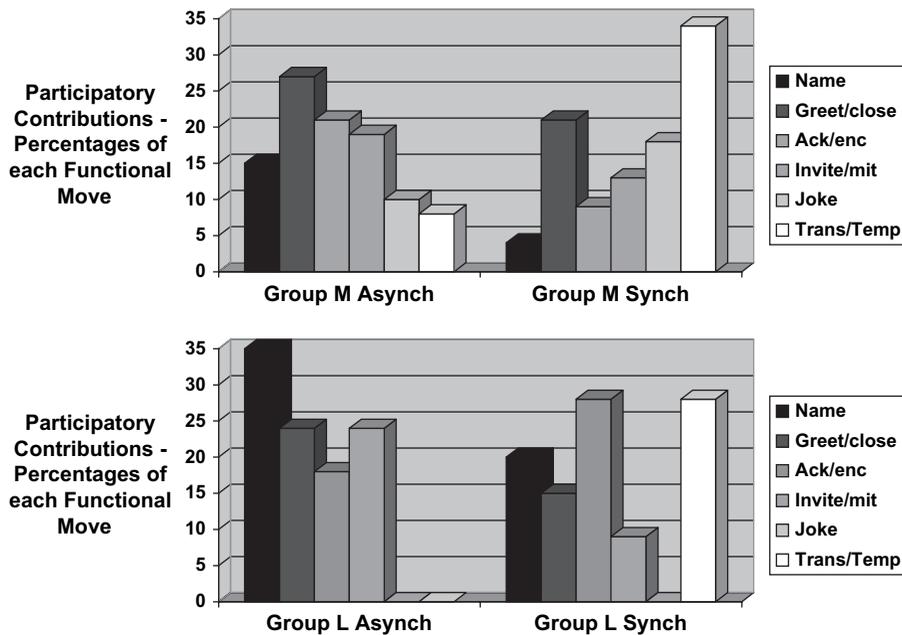


Figure 2 Participatory contributions.

Names were used more by both groups in the asynchronous environment, perhaps because a sense of presence needs to be established in the absence of real-time interaction. However, using names could lend coherence to chat conversations. Invite/mitigate was also used more in the asynchronous conversations. Perhaps the delayed time in these environments encourages participants to be explicit in encouraging response since immediate feedback is not possible. Phatic exchanges such as greetings and closings occurred in both modes, but slightly more in asynchronous than synchronous.

Transitional and temporal moves were used by both groups mostly if not exclusively in the chat environment. These were used, for example, when the group was referring to the textbook or their class notes. The excerpts in Table 3 from Group M's conversation reflect how the group members were negotiating meaning in real time.

Thus, functional moves to establish presence (naming, greeting/closing, inviting) in particular, were exchanged more frequently in the asynchronous environment. In chat, functional moves were often real-time negotiation of meaning such as temporal and transitional moves.

b. Factual

Figure 3 compares how the groups used specific functional moves to make factual contributions to the conversations in each CMC mode.

Ask and answer moves were only present in chat. Often more answers were provided than questions asked. Table 4 provides an example from Group L:

Table 3 Example of temporal moves

Participant	Chat excerpt	Functional move
Mary:	where in the book does it talk about principles?	Ask
Robert:	exactly.	Agree
Ann:	i couldn't find any principles	Temporal
Mary:	me either	Temporal
Robert:	i couldn't really find it anywhere..i just found the model for classroom management.	Temporal
Robert:	and she didn't really use any of those	Temporal
Jean:	The principles are on p.26-27	Temporal
Mary:	what page?	Temporal

In the asynchronous environment the information exchange was a bit more one-way, with more claim/restate moves than in the synchronous environment. In time-delayed environments it may be easier provide opinions rather than interactively ask and answer questions.

c. Reflective

Figure 4 compares how the groups used specific functional moves to make reflective contributions to the conversations in each CMC mode.

Agreeing was by far the most common move in both modes. Group members responded to challenges only in the chat environment, but not in the asynchronous environment. Table 5 provides an example from Group M:

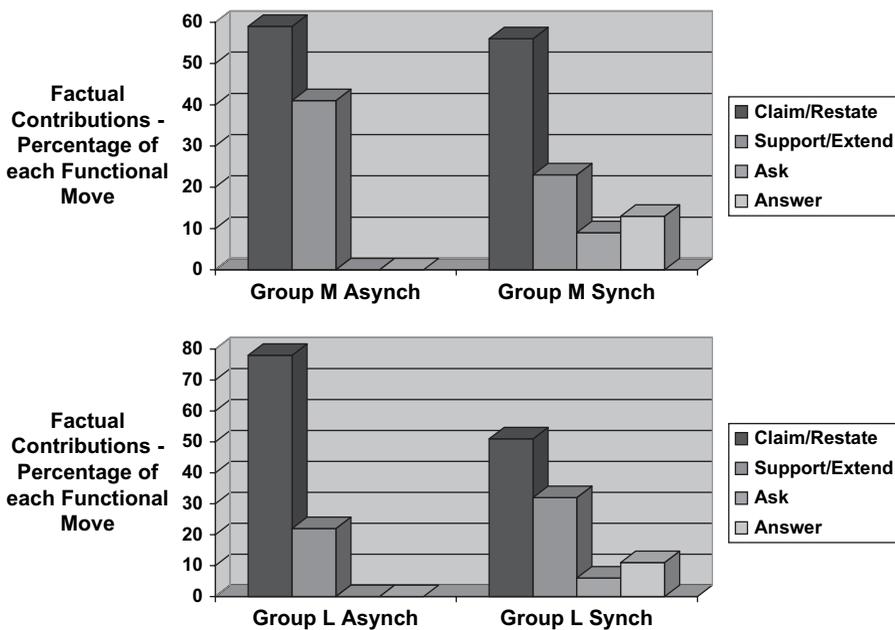


Figure 3 Factual contributions.

Table 4 Example of ask and answer moves

Participant	Chat excerpt	Functional move
Julie:	Do you think she could have supplied more feedback?	Ask
Julie:	And was the activity challenging enough?	Ask
Eddie:	good questions, I don't think she could have given more feedback	Acknowledge Answer
Deborah:	I think the feedback was pretty decent, as far as being motivating. The activity probably could have been more challenging	AnswerAnswer
Angie:	i thought she could have shown a little more examples.	Answer

d. Learning

Group M contributed three in the asynchronous mode, and Group L contributed one in the synchronous mode – too few to warrant further breakdown. While learning contributions did not occur often in either mode, Table 6 illustrates the one that did occur in Group L:

In summary, participation patterns were asymmetrical in both modes. Groups contributed more participatory moves to establish presence in the asynchronous mode and more factual moves in the synchronous mode. More asking, answering, challenging and responding occurred in the synchronous environment, and more claims were made in the asynchronous mode. Reflective moves in both modes were mainly to agree, and learning moves did not occur frequently in either mode.

Discussion

The purpose of the study was to see how students approached case analysis in the two CMC environments and to help educators better design such online discussion tasks. Our goal was for students to engage in meaningful dialogue, utilizing the Booth and Hulten (2003) framework to better understand their conversations. We found an interplay between the conversation characteristics, the affordances of each mode,

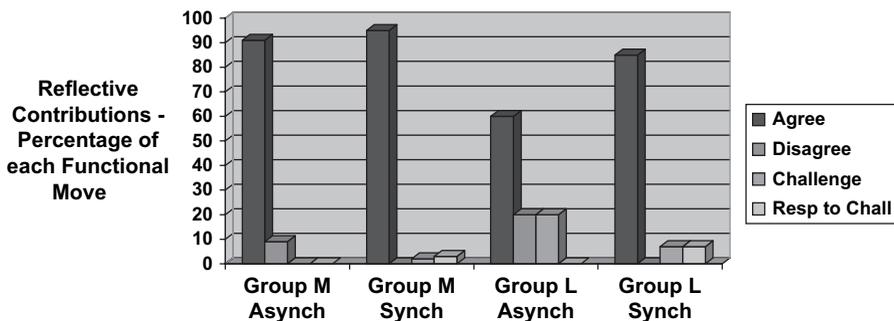


Figure 4 Reflective contributions.

Table 5 Example of challenge and respond moves

Participant	Chat excerpt	Functional move
Mary:	she had a good introductory focus strategy	Claim
Jean:	Would that be considered modeling	Ask
Jean:	Yes, I concur. How do you think she should (sic) good introductory focus?	AgreeChallenge
Robert:	by asking the students to feel their legs it got their attention and provided a framework for the lesson	Respond
Mary:	the lobster was a good way of introducing the idea of arthropods. it got their attention when she pulled it out of the ice chest	Respond
Ann:	everything that she used as an example, the students could relate to in real life	Claim
Jean:	Yes. Also along with what Robert said when Pauline did not get it - she touched the teacher and understood then why she was not an anthropolod	AgreeExtend

students' experiences with and preferences for the modes, and their epistemological beliefs.

Participants engaged in negotiation of meaning in the chat in a way that did not occur in the asynchronous forum. This included asking, answering, challenging and responding, moves which are consistent with previous research (Cox, Carr, & Hall, 2004; Davidson-Shivers et al., 2001; Hough et al., 2004; Davidson-Shivers et al., 2001). Reflection did occur in both modes, countering previous research in which asynchronous conversations had more reflection and deeper thinking (Im & Lee, 2003-2004; Davidson-Shivers et al., 2001).

More technical difficulties occurred in the chat, and conversations moved rapidly, pointing to the need for participants to be familiar with this environment before embarking on the task. As in the case of Robert and Deborah, students who were inexperienced or encountered technical difficulties were not able to contribute as much to the conversations.

Table 6 Example of learning contribution

Participant	Chat excerpt	Functional move
Angie:	i thought she also used trans0fer in her lesson through the examples	ClaimSupport
Julie:	Is there anything else to add on how she could have done the lesson differently to increase the learner motivation in the lesson?	Invite
Eddie:	Yea examples in this lesson were important, the teacher brought so many to the class	Extend
Julie:	I hadn't though to of that, Angie	Learn
Julie:	and they were all hands on, which made it more interesting	Extend

While previous studies have reported more equal participation in synchronous environments (e.g. Pena-Shaef et al., 2001), participation remained asymmetrical in both modes. Yet chat was perceived as having more equal participation. Julie commented in her reflection: “. . . I almost felt as if I was dominating the conversation, but as I read back over it, I realized that we all spoke a lot.”

Ultimately the groups returned to the environment in which they had had initial success and had contributed the most learning moves: Group M to the discussion forum and Group L to the chat, even though two members of Group L did not like the chat. Inconvenience, technical difficulties and incoherent conversations were the greatest drawbacks to the chat environment. Problems with incoherent conversations in chat were also reported by Davidson-Shivers et al. (2001) and Schweitzer, Paechter and Weidenmann (2003). Some students would have preferred completing the analysis face to face. Mary suggested, “It seems to me the only way to make the third case study different would be to have us physically meet and talk about it. I do not know if it would be better because of scheduling conflicts but I feel it would be better than the chat.” Robert, also in Group M, concurred: “I think that using the message board again or even meeting in person to discuss the case study would be an improvement for Case Study 3.” Schweizer et al. (2003) found that face to face meetings and videoconferencing were the best modes for sharing and exchanging knowledge for joint solutions.

In fact both groups chose to start their dialogue by planning face to face. Benbunan-Fich and Hiltz (1999) found their participants to be more satisfied with the face to face interactions to discuss cases, but produced better solutions in the asynchronous context. Heckman and Annabi (2005) also found that the asynchronous discussions generated as much and even more high level cognitive processes than did the face to face discussions. Blended learning environments allow students to strategically select the tools best suited to their preferences and to the task at hand (Kerres & De Witt, 2003; Rourke & Anderson, 2002.) Davidson-Shivers, et al. (2001) found that both the synchronous and asynchronous environments were viable and that students should be given a choice of modes. Levin et al. (2004, 2006) and Davidson-Shivers et al. (2001) argue that providing a choice of CMC tools is important and consistent with adult learning theories. This is consistent with findings by Rourke and Anderson (2002) in which their small groups of instructional technology graduate students strategically chose which technologies to use to complete their tasks, going so far as to *not* use the tools they were asked to use for purposes of the study. Levin et al. (2006) argue that preservice teachers need experience with both modes, and that their participants’ preferences changed from the asynchronous to synchronous environments.

Experience seemed to help both groups complete the second case studies more smoothly. Robert shared in his reflection: “I think this case study went much smoother, mostly because we had become accustomed to doing them.” Eddie felt the same way: “The first case study did not go as smoothly, but that is to be expected since the entire process was new to everyone in the class. Once we got comfortable

with the technology and the requirements of the case studies the entire process went very well.” Even though students may not be initially satisfied or comfortable with CMC initially, this may change with time and experience.

As in our first study, the students’ epistemological stance likely impacted how the groups approached the case analysis in each environment. Despite the instructor attempts to cultivate a new epistemological stance after the first case analysis, few of the pre-service teachers seemed to alter their stances. Excerpts from the reflections make this clear. Jean said, “This case study experience did not help me or hinder me in my learning experience. I simply prepared for the case study before the chat and I learned what I needed to then.” Mary also felt that this was just one more venue for mastering the course material, “Overall the case studies were ok but we did a lot of the same thing in class with the worksheets so it got a little redundant.” Unlike participants in the Rourke and Anderson (2002) study, who reported learning the most through peer dialogue and negotiation, our participants continued to approach the discussions as a place to display their mastery of the material.

Conclusion and Implications

We plan to next examine the third case analysis of the course, where students were able to choose the CMC mode. However, previous studies have shown that students do not necessarily perform the best in their preferred communication mode. Over time students may become more comfortable in modes they do not initially prefer. Instructors should be patient, giving students time to get used to each mode, understand its affordances, and then select what works best for them. Initial face to face conversations may help build trust and facilitate a focus on the task more quickly. Participation is not necessarily more equitable in any mode, so expectations in this area should be clearly outlined for the students.

Changes in epistemological stance do not happen quickly. We found similar orientations to submitting “the right answer” regardless of feedback given on the first case analysis task, our attention to various stances in class, or use of various CMC modes. We believe, though, that the more students are exposed to this type of learning activity, the more they may come to value the contributions of their peers. Tsai and Chung (2005) emphasize the relationship between epistemological beliefs and preference for open-ended group tasks in Internet learning environments. Epistemological changes, like changes in preference of CMC mode, occur over a longer period of time, perhaps beyond the semester confines of our time with them.

Our understanding of what constitutes evidence of learning in a conversation has changed as a result of this study. We note the difficulty of adapting existing analytic frameworks to understand learning contributions to online discussions. Our assumption entering the study was that learning contributions were preferred to the other types; we understand now that all types of contributions are needed and have value. Participatory contributions, for example, are essential in asynchronous discussions. The prevalence of reflective rather than learning contributions in both

modes by both groups are likely connected to the type of task. While the case analysis was intended to be viewed as open-ended, the students viewed it as a chance to display their mastery of the textbook material. Unlike the engineers in Booth and Hulten's (2003) study, the pre-service teachers were not working on an open-ended design project. Thus they did not view themselves as having something original to offer to the task at hand. Critical reflection, rather than problem solving, is a more apt description of what was intended by the case analysis. For these pre-service teachers, making meaning consisted of supporting each other to understand the textbook and the case. Rather than creating something entirely new, they engaged to reflect upon and master the theories of the course. Thus the participatory, factual and reflective moves are logically more relevant to the particular conditions of this task.

We conclude from our findings that adopting a blended approach to online case study analyses may be ideal. Both synchronous and asynchronous modes can be viable for meaningful conversations (e.g. support reflection), provided students are given experience using each mode. Each mode has particular affordances. Asynchronous environments may be more convenient and linear, but participants may spend more time establishing their presence with participatory contributions. Synchronous environments may support interactive negotiation of meaning, but participants initially may find conversations difficult to follow and more prone to technical difficulties. Integrating the various modes will be our next iteration of the design of this task. We will give students the opportunity to talk and build trust face to face, post initial claims and reflections in the asynchronous forum, and then follow up with a synchronous chat where they engage in dialogue about what they had posted. As with this iteration of the task, we will provide clear guidance as to what type of participation and dialogue is expected.

Further research needs to connect what is happening in such online conversations with external measures of learning of course objectives. Student preferences, epistemological beliefs, characteristics of the conversations and learner achievement should be investigated over time to better understand longitudinal change and how these processes intersect.

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Appendix A: Case Study #2

How to Participate

Case study #2 covers chapters 10, 11 and 12. It will last for one week and is worth 5 points of your overall course grade. The second case study officially begins on Thursday, March 18 and ends on Thursday, March 25 at midnight.

You will be in the same groups as for case study #1. This time you'll get to communicate synchronously (in real time) utilizing an electronic chat tool. You will want to schedule at least one chat session of approximately 1-2 hours in length to talk about the case studies. Decide with your group when to hold these sessions and which tool you will use. It is very important that you save an archive of your chat transcripts to submit along with a summary analysis.

Your group can use whatever instant chat tool you like, as long as you are able to save the transcripts! Our graduate assistant will come to class on Thursday. She and I will show you how to use Blackboard's Lightweight Chat Tool. She will be available to help answer any questions you have about the technology.

Your group can hold your actual chat conversations about the case study at anytime. However, the archived transcripts must be visible in Blackboard and/or uploaded to the dropbox by midnight on March 25th and the summary analysis must also be uploaded to the dropbox by midnight on the 25th.

Preparing

1. The case study gives you the opportunity to connect class readings with real-life classroom examples. Review Chapters 10-12 and your class notes. Read the case itself and think about the analysis questions. Be prepared to make a meaningful contribution to your group's discussion. Ask questions of your group members. Compare and contrast ideas. Together decide how best to summarize your conversation.
2. Decide with your group when to have your chat meetings. Also choose the chat tool that is most convenient for everyone to use (e.g. Blackboard's Lightweight Chat, Microsoft Messenger, AOL Instant Messenger). Remember that with synchronous chat you all have to be logged in to talk at the same time, but you do not have to be in the same location. Take into consideration the speed of your Internet connection on campus or at home and where you have the best access to Blackboard.
3. REMEMBER TO ARCHIVE YOUR CHATS! Participate in the instant chats and archive your chat transcripts. Decide how to summarize your discussion for submission.
4. Be sure your archived chat is visible in Blackboard if you use the Lightweight Chat. If you use a different chat tool, upload the archived transcript to the dropbox.
5. Upload the summary of the analysis to your group's digital dropbox in Blackboard.

Assessment

Individual Scores (2.5)

- You participated in the synchronous chat meeting with your group
- You were clearly prepared as evidenced from your meaningful contributions to the chat discussion
- You asked questions and responded to your group members

Overall Quality of Case Study Analysis (2.5)

- The archived transcript of the chat meeting is visible in Blackboard or has been uploaded to group dropbox by midnight on March 25th
- The summary of the case study analysis is uploaded to group dropbox by midnight on March 25th
- The case study analysis is thoroughly supported by readings with specific references to the case itself

Appendix B: Coding scheme for contribution type and associated functional moves

Participatory contributions		
Functional moves	Description	Examples
<i>Name</i>	Referring to participants by name	“good call, Julie”
<i>Greet/close/joke</i>	Announcing presence wrapping up the task, ending the conversation, joking around	“I think we covered most of it.”
<i>Acknowledge/encourage</i>	Positive response to a statement which was made by another	“Yes, and they discussed their own bodies, which was personalization.”
<i>Invite/mitigate</i>	A general request for input/feedback from others and/or suggest his/her idea is not the only correct one	“expectancy X value maybe?”
<i>Transition/temporal</i>	Directing the conversation to a previous or new topic, perhaps self-correcting, place holders related to the immediate chat conversation	“but back to Mary’s question”“-hang on a sec and i can tell you why”
Factual contributions		
Functional moves	Description	Examples

(continued)

Participatory contributions		
Functional moves	Description	Examples
<i>Claim/restate</i>	Make a new claim, express new idea, restate without explicit connection to the prior post	“It seems that she maybe has pre-conceived notions about Andrews behavior, and therefore didn’t give him the benefit of the doubt”
<i>Support/extend</i>	Support claim with experience, examples, reference to case itself, reference to class lecture, textbook; extend or add to idea	“i thought she also used transfer in her lesson through examples” “Yea examples in this lesson were important, the teacher brought so many to the class”
<i>Ask</i>	Ask questions of each other; e.g. specific request for clarification	“Do you think the motivation was behavioral, humanistic, or cognitive? (chapter 10)”
<i>Answer</i>	Answer question; e.g. specific questions for clarification	“maybe cognitive, because it deals with self determination”
Reflective contributions		
Functional moves	Description	Example
<i>Agree</i>	Agreement with another’s specific statement about the case	“yes, she used very high-quality examples”
<i>Disagree</i>	Disagree and offer an explanation/alternative; identify an inconsistency, problematize	“I would have to disagree that assigning the problem solving task would have...I feel that the students gained...”
<i>Challenge</i>	Asking questions related to the content beyond simple clarification (may follow a disagreement)	“how would you involve fantasy for this lesson, though”
<i>Respond to challenge</i>	Responding to questions related to the content	“maybe fantasy about being an arthropod”
Learning contributions		
Functional moves	Description	Example
<i>Learn</i>	See something new or in a new way	“I hadn’t thought of that, Angie”

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