

## A Study of Synchronous Versus Asynchronous Collaboration

This paper presents the results of a case study that examined the collaborative experiences of students in an online business writing classroom. The purpose here was to examine the same groups of students working on collaborative writing assignments in both a synchronous (real-time) and asynchronous (non-real-time) discussion forum. This study focused on examining the amount, pattern, and focus of interactions, as well as assessing students' attitudes toward communicating in the two different environments.

### Research in Online Interaction

Not surprisingly, research has shown that students tend to rate more favorably online courses that are student-centered and that promote interaction (Verneill & Berge, 2000; Berge, 1995). Moore and Kearsley (1996) argue the importance of interaction in the learning experience and categorize interaction as one of three types: learner-content, learner-instructor, and learner-learner interaction. Similarly and with specific reference to online courses, Guay (1995) separates interactivity into three types: navigational (user clicking on hyperlinks to go to different pages), functional (user and computer work together to achieve a goal—solving a problem or finding information), and adaptive (user has ability to alter the page). Much attention in online courses has focused on students' interaction with content and the instructor's interaction with students (Hiltz, 1994; LaMonica, 2001). Moore and Kearsley's (1996) third category (learner-learner interaction), however, often receives less attention in the literature. Since there may be some indication that online students have more difficulty creating the types of classroom communities that may foster interaction (Stephenson, 2001), often the focus of research in this area is on *how* to get students to participate in online discussions with each other

(Severn, 1998) or *how* to evaluate their contributions when they do contribute (see, for example, Levenburg & Major, 2000; Muirhead, 2000).

Yet the amount and quality of learner-learner interaction is an important consideration for online courses that seek to move beyond the correspondence model of distance learning. Online courses that place an emphasis on learner-learner interaction often recognize that knowledge isn't handed down from the instructor, but rather constructed in the context of the course. Lapadat (2002) argues that the social constructivist view of learning recognizes learning as “interactive, discursive, and situated” and that “online courses have the potential “to foster pedagogies and learning environments designed according to constructivist principles.” Furthermore, these principles are more in line with the types of skills businesses seek today—that is, an emphasis on problem-solving, team building, information processing, and a familiarity with technology (Eastman & Swift, 2001). Interactive technology makes it easier for students to acquire such workplace skills. Garrison and Onken (2002) note that “businesses expect these skills, and the student is often at a competitive disadvantage without them” (p. 73).

With this fact in mind, instructors who teach in an online environment are aware of the need to promote interactive learning experiences. Instructor-student and student-student interaction should be a key feature of any interactive online course. Richardson and Ting (1999) found that online students felt that all interactions with instructors were important. Hawisher and Pemberton (1997) report a correlation between the success of an online course and the value instructors placed on communication with and among students. Similarly, Bull, Kimball, and Stansberry (1998) found that learning is more

effective in an online course if there is interaction among learners. Jakupcak and Fishbagh (1998) suggest that anywhere from one-half to one-third of class time should be set aside for interaction. Additional studies have found that opportunities for interaction in an online course can lead to an increase in positive attitudes about the class and an increase in students' motivations to succeed in the class (Fulford & Zhang, 1993; Ritchie & Newberry, 1989).

Online courses that follow such models and create opportunities for learner-learner interaction generally do so in the context of some form of either synchronous (real-time) and/or asynchronous (non-real-time) conferences. An instructor's decision to use one type of online discussion versus another may be based on practical concerns—e.g., can students meet online at the same time for synchronous discussion? Or the decision may be based on a preference of one type of software over another. Studies in synchronous and asynchronous online communication in the context of the online classroom have revealed, however, that these two different forms of communication may indeed affect differently patterns of communication and interaction among students.

In synchronous conferences, popularized by such programs as IRC Chat or Instant Messaging, participants are online at the same time communicating with each other by typing in and reading text in real-time. Synchronous communication is more closely akin to a traditional classroom discussion, except learners do not always have the benefit of body language or other social cues. As an added constraint, communication occurs more slowly because participants are communicating via text. Because communication is occurring in real-time here, messages appear in the order in which they are sent, without being sorted or categorized in any way. Consequently, synchronous communication may

be characterized by multiple conversational threads, not necessarily in topical sequence (Herring, 1999). Multiple topics may be addressed at the same time, and some not at all (Black, Levin, & Mehan, 1983).

Conversely, asynchronous conferences, such as Web discussion boards, are not constrained by time or sequence of conversations. While text conversations in synchronous conferences may be rapid and more akin to face-to-face conversation, text messages in asynchronous conferences more closely parallel the type of writing style one would find in formal, written language. Therefore, asynchronous conferences tend to focus more on substantive issues and less on general conversation, unlike synchronous conferences that may give more prominence to the social aspects of interaction (Lapadat, 2002). Additionally, no time constraints are placed upon participants in asynchronous conferences; they have more time to formulate responses to messages and may choose to navigate messages in a non-linear order. Because of these characteristics of asynchronous conferences, the discussions occurring here can become a type of prewriting activity (Mabrito, 2000).

As the research suggests, building some type of online interaction into a course may help to facilitate learning while fostering the types of learning and communication skills that students may need in their future careers. Yet not all forms of online interaction may produce the same results. Whether students communicate with each other in a synchronous or asynchronous environment may have some effect in terms of communication patterns and the types of interactions that may occur.

## A Study of Synchronous Versus Asynchronous Communication

The purpose of this study was to examine how the same group of business writing students would communicate with each other in an online course using both synchronous (real-time chat) and asynchronous (a non-real-time, threaded discussion board) forms of communication. The specific intention here was to record these conversations in an attempt to analyze the amount and focus of communication that occurred within the group, as well as students' attitudes toward the two different forums for communication. The following questions were considered:

1. Would the amount of interaction differ between asynchronous and synchronous communication sessions?
2. Would the focus of group conversations vary between asynchronous and synchronous communication sessions?
3. Would the pattern of discussions differ?
4. Would students report different attitudes toward participating in the two different types of sessions?

### Design

A case-study approach was used. The students participating in this study were 16 junior- and senior-level college students enrolled in a business writing course. These eight men and eight women were randomly grouped into four project teams of four members each. All students reported prior experience with using both synchronous and asynchronous communication; seven of the students had previously completed online courses where some form of online discussion was featured. Students' mean age was 25.2 (SD = 2.7).

Results presented here were gathered from two group sessions that focused on two different collaborative writing projects. The projects were similar in nature, both involved writing short reports in response to a case prompt. For the first assignment, two of the groups were instructed to meet in a real-time chat room for as often as they felt they needed to effectively work together on the assignment. The other two groups received the same instructions, only directed to use the non-real-time Web discussion board for their meetings. Additionally, when using one form of communication for a given project, students were denied access to the other one. For the second project, groups were switched.

When meeting in real-time, students used the real-time conference feature provided with WebCT/Vista™ (see Figure 1). For non-real time meetings, they used a Web discussion board (see Figure 2). Both options allowed students to review discussions online, save the discussions, and print them if they saw fit.

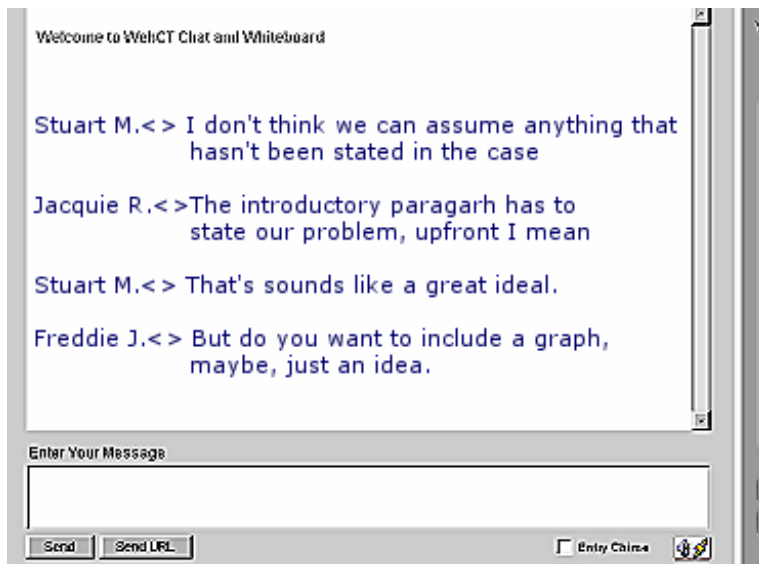


Figure 1. Screenshot of WebCt Chat Client.

- [Cerner Corp.](#) - Ben [REDACTED] 21:15:23 10/06/2003 (0)
- [Stiff Competition](#) - Devan [REDACTED] 19:17:35 10/06/2003 (0)
- [Employers 2003 Hiring Outlook](#) - Devan [REDACTED] 19:17:35 10/06/2003 (0)
- [Job seekers using new methods to pursue employment](#) - Devan [REDACTED] 19:17:35 10/06/2003 (0)
- [100 best places to work](#) - Amy [REDACTED] 6:25:04 10/06/2003 (0)
- [Discover Financial Services](#) - Amy [REDACTED] 16:13:44 10/06/2003 (0)
- [Waiting to go to Business School](#) - Devan [REDACTED] 15:06:42 10/06/2003 (1)
  - [Re: Waiting to go to Business School](#) - Ben [REDACTED] 21:17:58 10/06/2003 (0)
  - [For anyone interested in Master of Business Administration](#) - Devan [REDACTED] 15:06:42 10/06/2003 (0)
- [Grad School](#) - [REDACTED] 11:50:04 10/06/2003 (1)
  - [Re: Grad School](#) - Amy [REDACTED] 13:30:48 10/06/2003 (0)
- [GPA and resume's](#) - Devan [REDACTED] 10:05:01 10/06/2003 (2)
  - [Re: GPA and resume's](#) - Ben [REDACTED] 21:17:58 10/06/2003 (0)
  - [Re: GPA and resume's](#) - Amy [REDACTED] 13:49:25 10/06/2003 (0)
- [online hiring](#) - Amy [REDACTED] 23:27:50 10/05/2003 (0)

Figure 2. Screenshot of Web discussion board

### Collection of Data and Analysis

In order to determine if different communication patterns existed between the two discussion forums, transcripts from all sessions were saved and analyzed. Two independent raters analyzed the transcripts; inter-rater reliability was 87%. In order to quantify the amount of discussion, raters first segmented the discussions into communication units (Loban, 1976). A communication unit, as defined by Loban (1976), is “an independent clause with its modifiers” (p. 4). For example, “I don’t want to write my manager without knowing what I’m talking about” is an example of a single communication unit.

After being divided into communication units, the units themselves were categorized as to their individual focus. A scale was devised to categorize the units into the following areas of focus: *text planned*—if the comment was meant to facilitate the creation of text (e.g., “I want to talk about the problem in the first paragraph” or “I think we want to avoid a hostile tone here”); *text written*—if the comment was on a particular aspect of text that had previously been created (e.g., “Your fourth sentence is confusing”

or “I like the way we emphasize the problems”); *group procedures*—if the comment related to process/procedures concerning the group (e.g., “I’ll draft the opening by Friday” or “What do you think we should do next?”); *group general*—if the comment didn’t relate to any specific aspect of the project but was meant as a way to socialize within the group (e.g., “I’m taking two Management courses next semester” or “Did you see the game last Sunday?”).

Finally, communication units were categorized as either topic (initiating a new topic of discussion) or comment ( a comment or reply to a previous statement). At the conclusion of each project, students also completed a brief survey to determine their attitudes toward each of the discussion sessions.

### Results and Discussion

A comparison of idea units produced during both synchronous and asynchronous meetings revealed differences in terms of how students interacted in these two environments. Students exhibited different levels of participation during the two different sessions; they also displayed differences with respect to the pattern of interactions and the focus of conversations. Additionally, students’ perceptions as to the effectiveness of the different group meetings revealed some interesting differences. These results are summarized as follows.

#### Amount and Pattern of Discussions

The focus of the first question was whether the amount of interaction would differ within groups between real- and non-real-time interaction, as measured by number of communication units. As we can see by the total number represented in Table 1, groups on average did communicate more in synchronous (real-time) sessions ( $M = 720$ ;  $SD=57$ )

than they did in asynchronous (non-real-time) sessions ( $M = 523$ ;  $SD = 62$ ). This pattern can be seen in all four groups. Even though there were external factors during these real-time communication sessions that may have made it harder for students to participate (for example, the speed at which one can type and process the written comments of others), students here generated more conversation than they did during non-real time meetings.

**Table 1**

**Number of Communication Units Per Synchronous and Asynchronous Group Meetings**

	Synchronous (Real-Time)	Asynchronous (Non-Real Time)
Group 1		
n	634	463
M	159	116
SD	27	32
Group 2		
n	853	612
M	213	153
SD	41	34
Group 3		
n	512	317
M	128	79
SD	21	26
Group 4		
n	879	701
M	220	175
SD	38	34
<b>Groups 1-4</b>		
n	2878	2093
M	720	523
SD	57	62

NOTE: n = number; M = mean; SD = standard deviation

Although students communicated more with each other during the real-time sessions, the pattern of communication between these two sessions was quite different. As we can see by Table 2, real-time conversations produced many more new topics of

conversation, but with very little follow up or expansion of these topics. On average, during real-time meetings, groups spent 69% of their discussion time initiating new topics of conversation and devoted only 31% of that time to providing follow-up comments to those topics. An example of this conversation pattern is provided below:

**Table 2**  
**Patterns of Discussion: Topics Versus Comments**

	Synchronous (Real-Time)	Asynchronous (Non-Real Time)
Group 1 % Topics % Comments	68 32	46 54
Group 2 % Topics % Comments	72 28	53 47
Group 3 % Topics % Comments	61 39	41 59
Group 4 % Topics % Comments	73 27	51 49
<b>Groups 1-4</b> % Topics % Comments	69 31	47 53

**Evan:** We need to establish criteria in the opening segment (Topic 1)

**Angel:** I'll go along with that if you want to do it that way (Comment 1)

**Bob:** I don't know hard it is going to be to find research on wellness centers (Topic 2)

**Gloria:** My ex used to be in finance (Topic 3)

**Angel:** Cost has to be a criteria its always a criteria (Comments 1)

**Evan:** Where did he work (Comment 3)

**Gloria:** I'm more persuaded by arguments that feature real numbers (Topic 4)

**Evan:** I don't want to have to write the whole discussion section, hint hint (Topic 5)

**Bob:** I think something like popularity should be a criteria (Comment 1)

**Gloria:** I don't read a bunch of BS if it can't be supported (Topic 6)

**Bob:** This seems like a screwed up place to work (Topic 7)

**Bob:** I can make up some sample charts that we all can review (Topic 8)

**Angel:** I got too many classes this semester (Topic 9)

(Note: Comments are numbered /referenced in terms of the topics to which they refer.)

During these real-time meetings, students communicated more, but much of this communication was devoted to exploring topics of discussion that didn't receive much further exploration or development from the group. Thus many new topics were introduced into the discussion, but never followed-up by either other group members or the original contributor. The result was conversational pattern that lacked depth and also produced many ideas that were left dormant and never fully explored.

Conversely, in asynchronous sessions, student conversations followed quite a different pattern. Although students generated less conversation during these sessions ( $M = 523$ ;  $SD = 62$ ), the topics that were generated received many more follow-up comments. On average students devoted 47% of their collaborative time to generating new topics of discussion, yet spent the majority of the time (53%) expanding upon these topics of discussion. An example of this pattern of conversation is presented below:

**Jesus:** The city council will want to control cost on any solution presented (Topic 1)

**Patty:** I would present a chart indicating cost-breakdown (Comment 1)

**Lisa:** That's too much detail for a short report (Comment 1)

Are you supposed to even have charts in a short report? (Comment 1)

If you all want to present cost figures I'll go along (Comment 1)

**Patty:** I want to put a bullet list in the intro that introduces the problems (Topic 2)

**Jeff:** You run the risk of overwhelming the reader with that detail (Comment 2)

Not all of it is important to the reader (Comment 2)

**Jesus:** I don't want to read all that (Comment 2)

**Lisa:** Just try to focus on two of your main problems (Comment 2)

And present in a highlighted list (Comment 2)

**Patty:** But they may think I didn't do my research with such few facts (Comment 2)

During these asynchronous meetings, the conversational pattern resulted in deeper threads of conversation—that is, with more follow-up comments provided to initial topics of discussion. Consequently, ideas here were more fully explored and students spent a greater time providing supporting evidence to other students' initial claims.

The conversations here were richer in the sense that ideas became more fully developed by supporting claims. As a result, even though fewer topics were introduced during asynchronous sessions, these topics became “layered” with many more follow-up comments.

#### Focus of Discussion

In addition to the amount and pattern of communication units, the third research question sought to determine if there would be differences in the content of these discussions. As we can see by Table 3, during real-time meetings, groups on average focused a good deal of their discussions (32%) on deciding *group procedures* (for

example, assigning tasks to members) and on just general conversation (*group general* = 33%) that had no direct bearing on the writing task, but did seem to promote group bonding (for example, discussing a current movie or class schedules). The percentage of *text-planned* comments, comments related to the production of the document, occupied only 20% of conversations during these real-time meetings. Similarly, time spent reviewing and commenting upon parts of the document that had been written (*text-written*) occupied 15% of the conversation. Most of these comments were in response to passages of text sent as attachments, rather than on text that had been composed during the group meeting. Additionally, many of the *text-written* comments produced during these synchronous meetings were more general in scope—for example, “Could you add more detail” or “How about some examples?”—rather than addressing specific passages of text.

Most likely, the more rapid nature of conversations here prevented group members from doing any significant composing while meeting online. Apparently, these synchronous sessions were effective in terms of team-building and providing direction to members on to how to proceed with respect to the writing task. But the actual decision-making process in terms of what should be included in the text or suggested revisions to previously written text received very little attention during these meetings. When students did address these latter issues, the comments seldom contained specific textual references.

**Table 3**  
**Focus of Discussions: Percentage of Text and Group Comments**

	Synchronous (Real-Time)	Asynchronous (Non-Real Time)
<b>Group 1</b>		
Text-Planned	28%	35%
Text-Written	14	49
Group Procedures	30	10
Group General	28	6
<b>Group 2</b>		
Text-Planned	20%	30%
Text-Written	16	53
Group Procedures	30	10
Group General	34	7
<b>Group 3</b>		
Text-Planned	14%	34%
Text-Written	19	57
Group Procedures	33	5
Group General	32	4
<b>Group 4</b>		
Text-Planned	19%	39%
Text-Written	12	49
Group Procedures	35	10
Group General	32	2
<b>Groups 1-4</b>		
Text-Planned	20%	34%
Text-Written	15	52
Group Procedures	32	9
Group General	33	5

Asynchronous conferences reflected quite the opposite in terms of the groups' focus of conversation. As depicted in Table 3, here very little of the discussion focused on the group (*group procedures* = 9%; *group general* = 5%). By far, the vast majority of the conversations were focused on planning text (*text planned* = 34%) or revising existing portions of text (*text written* = 52%). What was interesting to note during these conferences was not only the greater emphasis placed on the actual writing task, but also that a majority of the conversations here (52%) focused on commenting on text that previously had been written by someone else in the group. Many of these text passages were composed within the message board itself, rather than being sent as an attachment, as was evidenced in synchronous conferences. Some of these comments were intended to be “metadiscourse” (comments about the text) in nature, yet many were intended to be rehearsals for the formal, written text itself. An example is provided below:

**Jesus:** I don't think your third sentence is even necessary.

**Lisa:** I agree. I would say *We request you submit your feasibility study to us by the end of the week. If the board members find the cost figures to be acceptable we will plan on beginning the project as soon as possible. At that time we will ask you for a schedule of events.*

**Jesus:** I would add *we look forward to working with your team and would like to schedule a preliminary meeting for next week.*

(Note: Italics added for emphasis)

During these asynchronous meetings, the discussion board became in essence a prewriting space where “text-written” comments focused not only on how to revise text, but the comments themselves became segments of practice text for the actual document.

### Students' Perceptions of Synchronous and Asynchronous Discussion Forums

The fourth research question sought to determine how useful students found the two different discussion forums to be and to what extent they felt comfortable participating in these group meetings. Table 4 highlights the results of this anonymous survey. Interestingly, students' perceptions of the group meetings appear to be somewhat contradictory. For example, although the majority of group conversation during synchronous sessions focused on comments pertaining to the group and not to the writing assignment, students rated these sessions, by a fairly large majority of 75% (Q1: 44% A and 31% SA), as being productive. When asked to rate how productive they perceived the asynchronous sessions to be, only 50% (Q1: 44% A and 6% SA) rated these sessions as productive ones, even though the large majority of communication units in these sessions pertained to comments specific to either planning or writing the text. Students apparently were aware of this latter fact, since 88% (Q2: 38% A and 50% SA) reported that asynchronous group sessions helped them to do the writing assignment while only 31% (Q2: 25% A and 6% SA) reported the same for synchronous sessions. Although students realized that the synchronous sessions provided more substantive discussions (and, ultimately, more specific comments concerning how to write/revise the text), they perceived these sessions to be less productive.

**Table 4**  
**Students' Attitudes toward Synchronous and Asynchronous Groups**

	SD	D	N	A	SA
1. I felt our group sessions were productive ones. Synchronous Asynchronous	0% 8	19% 24	6% 16	44% 42	31% 8
2. The group sessions helped me to do the writing assignment. Synchronous Asynchronous	25 0	19 6	25 6	25 38	6 50
3. I felt my comments were useful to other group members. Synchronous Asynchronous	19 0	19 6	25 19	38 50	0 25
4. I felt comfortable participating in the discussion. Synchronous Asynchronous	0 19	6 25	19 25	44 25	31 6
5. The group worked well during this assignment. Synchronous Asynchronous	0 6	0 19	6 19	25 25	69 31
6. I would prefer this type of discussion forum in the future. Synchronous Asynchronous	0 6	0 25	0 19	31 19	69 31

*Note: 5-point Likert-type scale: strongly disagree (SD), disagree (D), neutral (N), agree (A), strongly agree (SA). Numbers rounded to the nearest percentage.*

Similarly, when asked how useful their own comments were to other group members, students overwhelmingly felt they contributed more useful comments during asynchronous sessions, 75% (Q3: 50% A and 25% SA), than they did during synchronous sessions, 38% (Q3: 38% A and 0% SA). Not surprisingly, students realized that both the comments they received as well as the comments they contributed to

synchronous sessions were of less value with respect to the writing task at hand than the comments generated during asynchronous sessions.

In terms of group dynamics, students reported feeling more comfortable participating in synchronous sessions, 75% (Q4: 44% A and 31% SA), than they did in asynchronous sessions, 31% (Q4: 25% A and 6% SA). In terms of their perceptions as to how well group members worked together, students tended to rate the group during synchronous sessions higher, 94% (Q5: 25% A and 69% SA), than they did during asynchronous sessions, 56% (Q5: 25% A and 31% SA). Finally, students were asked if they had a preference of one type of session to another. Students unanimously chose synchronous sessions, 100% (Q6: 31% A and 69% SA), over asynchronous sessions, 50% (Q6: 19% A and 31% SA).

In general, students' perceptions of how each session went illustrate a curious dichotomy of responses. On the one hand, students tended to perceive synchronous sessions as being more productive and sessions during which the group worked together better than they did asynchronous meetings. However, with respect to which sessions provided the most useful comments (whether they be the student's own comments or the group's) for completing the writing task, students also recognized that the asynchronous sessions were more effective in this respect. Also somewhat surprising is that when asked to indicate if they had a preference for one type of session over another, students chose the synchronous sessions by a 2 to 1 ratio.

## Conclusions

Although one cannot extrapolate the results of a small case study such as this one beyond these students, several interesting observations do emerge from the initial findings of this study.

When communicating via the synchronous conference, students spent more time interacting with each other, as measured by the amount of communication units generated. The pattern of conversation here followed what has been reported previously in the literature--that is, conversation characterized by multiple conversational threads with many topics not receiving follow-up comments (Herring, 1999). Since students expressed a preference for synchronous sessions, this perhaps might account for the fact of the increased conversational time spent here. Additionally, more of the conversations here were focused on the group than had been the case in asynchronous sessions.

Although students were readily aware that their synchronous sessions spent less time focusing on the writing task at hand, they still preferred to work in this environment, if given a choice. Another issue to consider here is that in students' personal lives, a type of "real-time chat" program is probably closer to what they associate with more social uses of language—e.g., chatting with a friend on an Instant Messenger program or chatting via IRC (Internet Relay Chat) . One might assume that little time is spent engaging in composing or analyzing written text during these typical sessions.

Clearly, the asynchronous sessions provided quite a contrary experience. Although students communicated with one another less during these sessions, more of the conversation in these sessions was focused on the writing task (and focused in more

substantive ways, as evidenced by the amount of actual “prewriting” that occurred during these sessions).

Based on these results, one might conclude that some form of asynchronous communication might be the most effective for collaborative writing experiences. However, that may not necessarily be the case. While certainly the asynchronous sessions here apparently provided an effective space for collaborative writing, they provided fewer opportunities for informal team building and also for informal writing. Although from a strictly utilitarian viewpoint, these asynchronous sessions may appear to be the most effective choice, one might speculate whether the collaboration would not have been richer if more time had been spent on exploring issues/topics informally and more time spent on “group talk” to move the group into exploring different perspectives and avenues. Thus, when building online, collaborative experiences, instructors may need to consider structuring collaborative time in both synchronous and asynchronous environments.

During this particular study, students did not have the opportunity to move between synchronous and asynchronous sessions while working on a given project. Conducting another study in which students are given that option may provide some interesting results. For example, under what circumstances might students chose to collaborate in a synchronous environment versus an asynchronous environment? Would the focus of their comments be similar to the ones in this current study, if students are able to self-select the medium for group meetings? Another dimension to consider is what type of software students use for group meetings. If students are allowed to choose their own instant messaging program, real-time chat program, or web board, might this

feature have an impact on how often they choose to communicate and the nature of this communication?

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