

When to Talk, When to Chat: Student Interactions in Live Virtual Classrooms

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Abstract

This study explores students' choices of verbal and text interaction in a synchronous Live Virtual Classroom (LVC) environment that mixed onsite and online learners. Data were collected from analysis of recorded LVC sessions and post-course interviews with students in two different offerings of a graduate instructional design course that used Adobe Connect as a live virtual classroom. Students could choose whether to participate onsite in a computer classroom or "live" online using Connect. Over the course of both semesters students increasingly chose to participate online and, overall, students chose to participate online (57%) more than onsite (43%). However, some students—especially international students—preferred to participate onsite even though it was less convenient and also meant that they were more likely to be "called on" for verbal responses. Analysis of LVC recordings and post-course interviews showed that text interaction in which students asked questions or made comments in the LVC chat box during the instructor's lectures was a preferred mode of interaction for students when they were participating both online and onsite. The emergent pedagogical strategy of integrated text interaction during lecture suggests a benefit of synchronous online learning.

Online learning is increasingly popular in higher education since administrators view it as an effective method to increase enrollment with fairly low cost (Allen & Seaman, 2005; Kim & Curtis, 2006; Maguire, 2005). Online learning also makes college courses available to many learners who would not be able to attend a full-time, on-campus program. However, a sense of isolation due to lack of interactions and resulting low-motivation among asynchronous online learning participants is considered to be a hurdle to effective online learning (Aoun, 2011; Boulos, Taylor, & Breton, 2005). Synchronous online learning in the form of live virtual classrooms (LVC) has emerged as a way to facilitate interaction in online learning. Also referred to as an electronic meeting or web conferencing, LVC allows learners to interact via synchronous texting and audio or video discussion with the instructor and with other students, potentially reducing feelings of isolation and raising learning motivation (Hrastinski, 2008).

The emergence of LVC with new channels of interaction has the potential to open up different pedagogical strategies in comparison with asynchronous online learning and traditional face-to-face classrooms. However, interactions in online learning do not occur automatically but

rather need to be incorporated consciously into the instructional design of online classes (Ragan, 1999). This exploratory study examines students' LVC interactions in two offerings of a graduate course on instructional multimedia in which students could choose, on a class-to-class basis, to meet with the instructor in an on-campus computer lab or to participate online at their own computers. During weekly synchronous class meetings both online and onsite students logged into the LVC, where the majority of class interactions took place.

Because the two offerings of the course studied represented a unique blended learning environment in which students moved freely between onsite and online participation, it is not possible to systematically compare onsite and online participation or to draw conclusions based on learning outcomes. Rather, this study focuses on two aspects of students' choice of interaction modes during synchronous class sessions. These student choices were studied in an action research context in order to improve the particular course (Mills, 2007) and also to gain insights about preferred interaction modes in LVC. The students' first choice was whether to attend class onsite or online. During class sessions, then, both onsite and online students could choose to participate verbally or through text in a chat box. The second choice that students made was what available media to use for class interactions. Typical interactions in the course involved students asking or answering questions and also offering comments, prompted or unprompted, during the instructor's lecture.

Video, audio, and text interactions are all possible in LVC environments, but they come with different degrees of difficulty. The course instructor rejected use of video for student interactions because past experience with LVC showed that use of multiple webcams increased the number of technical issues related to off-campus students' Internet bandwidth. As a result, students could choose whether to use audio or text channels for interactions.

The question of whether students prefer to interact verbally or in text has implications for the design of LVC offerings in part because granting online students "mic privileges" increases the technology overhead for both students and instructors. There is a cost/benefit consideration, then, in deciding if and when to include audio as well as text channels for student interaction in an LVC. While audio interaction is more difficult than text interaction in the LVC environment, it was easier for students when they were onsite to interact verbally in the traditional way of raising their hand to request speaking privilege. Therefore, this study provides a unique opportunity to investigate students' choice of interaction mode with less influence of technology limitations.

The role of student interactions in online learning

Researchers have long investigated the impact of student interactions on the teaching and learning process. Interactions benefit learners in receiving feedback from the instructor about their performance in course-related activities and also motivating them to engage in active learning (Prammanee, 2003). Successful learning outcomes are also facilitated when group members can share their knowledge effectively in the learning process (Soller, 2004a, 2004b). In the field of online learning, Pittinsky and Chase (2000) emphasized that it is the quality and frequency of interactions between learners and the instructor that affect the instructional value of online learning. White and Weight (2000) asserted that online learning is structured around the dynamics of human communications and features the asynchronous equivalents of traditional class discussions and learners' interactions. In addition, Thorpe and Godwin (2006) found that interactions in online learning help expand the learning relationships available and also help generate cognitive processes of explanation, reflection and internalization.

On the contrary, other researchers have pointed out that student interactions in online learning do not always contribute to learning outcomes and that learners do not place high value on interactions with other students in online learning. In a study investigating how MBA students perceive student-to-student interaction in an online setting, Kellogg and Smith (2009) reported that 64.5% of the participants did not perceive those interactions as being integral to their learning outcome. In the same vein, Wilkes, Simon and Brooks (2006) concluded that e-learners characterize themselves as different from their face-to-face counterparts and view student interactions, either with the instructor or among peers, as being characteristic of traditional learning and not online learning. Most of the studies cited do not report whether the interactions were synchronous or asynchronous. However, we assume that—unless specifically noted—the learner interactions studied were conducted in the dominant asynchronous mode (Chou, 2002).

Synchronous interactions in online learning

The earliest mode of synchronous interactions in academic settings was based on Internet Relay Chat or similar public synchronous communications programs (Archee, 1993; Murphy & Collins, 1997). These synchronous interactions were conducted mainly among learners for recreational, personal and social purposes in the form of text. Synchronous interactions allowed learners to interact with each other and with the instructor in real time, which could increase their learning enthusiasm and establish a sense of social presence (Aoki, 1995). A disadvantage of this type of interaction was that turn taking in synchronous interactions was convoluted since there were no observable kinesthetic or para-verbal clues to signal when a learner joined the conversation or changed the topic (Murphy & Collins, 1997).

By analyzing and comparing asynchronous and synchronous conference transcripts from weekly computer conferences held on *WebCT* bulletin boards and chat rooms in an upper level undergraduate course, Chou (2002) found that there were more social-emotional interactions among learners in synchronous mode than asynchronous mode. Schwier and Balbar (2002) analyzed the synchronous interactions of seven graduate students in *WebCT* chat rooms and found that synchronous interactions created connection and a sense of community among learners but were less effective than asynchronous formats in term of the content of the discussion. Hrastinski (2008) found that students in a graduate course had more social and planning interactions and fewer content-related interactions in synchronous online discussions than in asynchronous discussion forums. It seems important, therefore, to discern differences between synchronous and asynchronous communications in online learning.

Synchronous interaction in live virtual classrooms

Several studies have presented successful models or effective practices of LVC (Deshpande & Hwang, 2001; Yang & Liu, 2007). Other studies have compared web conference programs or software (Lavolette, Venable, Gose, & Huang, 2010; Schullo, Hilbelink, Venable, & Barron, 2007). However, few publications have investigated LVC design or implementation strategies. One such study was by Pullen (2004) in which he described synchronous Internet-delivered courses, which learners could take onsite or online simultaneously. Based on his teaching practice, Pullen made several observations. Audio was seen as a vital component of LVC for both online and onsite learners. In lecture-based classes, learners seemed to be satisfied with the ability to type their comments or questions as long as the instructor noted them quickly. In seminar-based classes, learners felt that audio input was much more important. Adding video to audio interactions contributed little to the educational experience for most learners. Finally, a

text “chat” was considered to be a useful channel for learners to interact among themselves about trivia.

Pullen also observed that some learners preferred to attend class in person, but found themselves in situations where the expense and time of doing so outweighed the perceived drawbacks of attending online. However, higher quality of audio and graphics and the ability to interact directly with the instructor and among peers, even if limited to text formats, compensated for the perceived disadvantages of attending a synchronous online class. Lastly, the researcher observed that the performance of learners in LVC environments was not significantly different from those who attended an onsite class.

Another LVC study examined why and how instructors used tools in *Illuminate Live!* and what perceptions learners and instructors had regarding this synchronous software (Schullo et al., 2007). The results showed that among many tools available, instructors used text chat and Voice Over Internet Protocol audio the most. According to the instructors in the study, *Illuminate Live!* let them build up connections with and among learners more effectively and raised the potential for communication in online courses while in the learners' opinions the software was of high quality and helped them achieve the lessons easily.

While previous studies suggest that synchronous text interactions can create a sense of community among learners but have limited instructional value, these studies mainly focused on synchronous text interactions in stand-alone chat activities. The study reported here is different in examining pedagogical aspects of synchronous interactions in an LVC, both text and audio, which occur during lecture-based instruction and have instructional as well as social value.

Background of course studied

Two sections of a graduate level Multimedia Design course at a Midwestern public university were analyzed for this case study. The first section was offered in Spring semester 2011 with 15 registered graduate students. The second section was in Spring semester 2012 with 13 registered students. Both courses were taught by the same instructor in a computer classroom. Both used a learning management system (LMS) as well as *Adobe Connect Pro* as an LVC. Before each class session, the instructor emailed the *Adobe Connect Pro* (ACP) class URL, which students could access on site in a computer lab or online at remote locations. In both cases students would log into ACP, which acted as the central meeting place of the class. In most class sessions the instructor lectured with supporting *PowerPoint* slides that were viewed in ACP on individual computers by both onsite and online learners; the slides were not projected in the classroom.

Both sections of the course also included an asynchronous discussion forum on the LMS for required class discussion in between weekly “live” class sessions. LVC sessions were recorded and URLs for class recordings were posted as web links on the LMS so that students could watch the recording if they missed the class or if they had difficulty understanding the lesson. Figure 1 shows a screenshot from an *Adobe Connect Pro* session. Windows show the attendees, video of the instructor, a multimedia tutorial being discussed by the class, and a chat box.

Although the class was 150 minutes long and broadcast in its entirety on ACP, the instructor typically recorded only 60 to 80 minutes that consisted of his preferred instructional format of *PowerPoint*-based lecture with questions asked by and to students along with comments offered by students. Both onsite and online students were encouraged to interrupt the lecture at any point to ask a question or to offer a comment drawn from their experience as

students or teachers related to interactive instructional multimedia. Both onsite and online students could write text questions or comments in the LVC chat box, or could gain the instructor's attention and verbally (onsite or online) ask a question or make a comment.

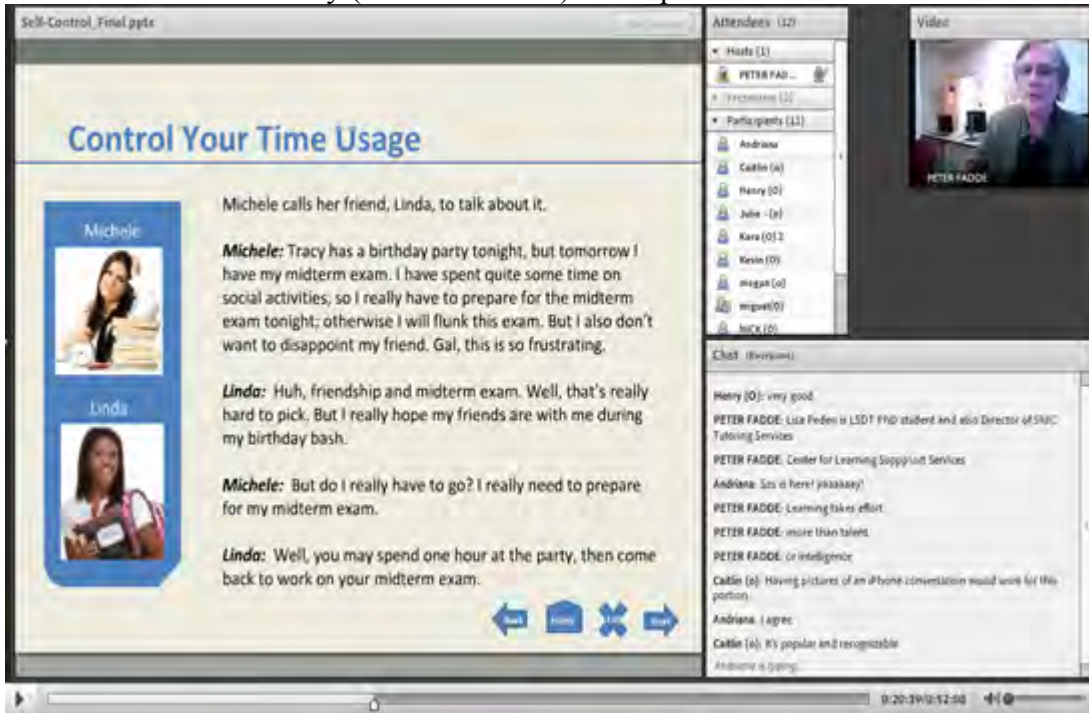


Figure 1. Screenshot of Adobe Connect Pro Session

Onsite as well as online students viewed the *PowerPoint* slides in the LVC environment; slides were not projected in the classroom. The instructor sat at a computer station and had video and audio transmitted by a USB microphone/webcam. Onsite students could hear questions and comments made by online students through the instructor's computer speaker. Online students could hear the comments or questions of onsite students through the instructor's microphone, which the instructor could move to better capture onsite students' verbalizations. Online students could virtually raise their hand and request microphone privileges to make verbal comments.

Data Sources

The study aimed to answer questions about general LVC use since the format is relatively new, along with the central questions directly related to student interactions in the LVC. The research questions were:

- What was the tendency of class attendance (onsite and online) in the LVC?
- Which channels of interaction (text or verbal) in the LVC were used and preferred by onsite and online students?
- Which types of interactions (questions, comments, others) were made in which channels?

Data collection occurred over two offerings of the course to ascertain the learners' use of and opinions about interactions in the LVC. At the beginning of the course every student signed a consent form that allowed the instructor to use data, artifacts, and communications produced in

the course for research purposes. Recordings of 25 class sessions that featured a lecture-based format were analyzed for the types of student interactions. After the course was completed, students were interviewed to gain further understanding of LVC interaction patterns revealed in the analysis of LVC recordings.

Research Method

This was an action research study in that it used existing classes, involved the participation of the course instructor, and was intended to improve subsequent offerings of the course (Mills, 2007). It used a mixed methods approach combining the paradigms of quantitative and qualitative research to ensure maximum insight into how students interacted in the LVC environment and their perception on this setting. The mixed methods design included two distinct phases: Quantitative phase followed by qualitative phase (Creswell, Plano Clark, Gutmann & Hanson, 2003). In the first phase, upon approval by the instructor, the researcher coded types of student interactions observed when viewing LVC recordings. The second phase consisted of follow-up interviews with students to help explain or elaborate on the quantitative results of the first phase (Creswell, 2003).

Results

Question 1. What was the tendency of class attendance (onsite and online) in the LVC?

Students' attendance onsite, online, and overall are shown in Table 1. Although the instructor did not require class attendance, typically no more than three students were absent even though students who missed the class session could watch the ACP recording of the session. All of the students attended class sessions both onsite and online, with most students choosing one environment more often.

Table 1

Class Attendance (Total and average number of students in class sessions)

	Online class attendance	Onsite class attendance
Course Spring semester 2011	97 (54%) On average 7.5 learners attending 13 class sessions	82 (46%) On average 6.3 learners attending 13 class sessions
Course Spring semester 2012	71 (61%) On average 5.9 learners attending 12 class sessions	45 (39%) On average 3.8 learners attending 12 class sessions
Total	168 (57%) On average 6.7 learners attending 25 class sessions	127 (43%) On average 5.1 learners attending 25 class sessions

As shown in Table 1, more learners attended class online than onsite in both the Spring 2011 and Spring 2012 offerings of the course. Our classroom observations in the Spring 2011 semester revealed that most of the six international students in the course consistently chose to attend onsite, which was somewhat surprising since onsite students were prompted to answer

questions or make verbal comments much more often (116 times) than online students (8 times) and international students might be assumed to be uncomfortable with responding verbally.

To discover why international students preferred attending the class onsite, we conducted follow-up interviews with several participating international students that revealed two reasons why international students preferred to attend the class onsite. One reason was that they felt that they had better and more immediate feedback from the instructor when attending onsite. The other reason was that participating in the class onsite increased their ability to understand the instructor. As expressed by an international student, "I can see the professor's face expression and body language in the onsite class, but in most case I only can hear the voice and see the *PowerPoint* slides from the online one."

Question 2. Which channels of interaction (text or verbal) in the LVC were used and preferred by onsite and online learners?

Not counting greetings at the beginning and end of each lesson, we tallied 685 interactions in 13 LVC recordings in the first offering of the course and 463 interactions in 12 LVC recordings in the second course offering. On average, there were about 50 student interactions in each class session, either among the learners or between the learners and instructor. Over the course of a semester students made an average of 43 interactions either with peers or with the instructor.

We divided students' interactions into two channels: text interactions via the chat box (by onsite as well as online students) and verbal interactions via the LVC audio channel or by live verbalization in class. For text interactions, we considered each entry in the chat box as one unit of interaction regardless of its length. Similarly, for verbal interactions we considered each utterance by the learner as a unit of verbal interaction. As shown in Table 2, learners used more text interactions via the chat box (80%) than verbal interactions (20%).

Table 2.

Channels for Student Interactions

Interactions	Text interactions	Verbal interactions
All	918 (80%)	230 (20%)
On-Task (Questions/Comments)	421 (67%)	215 (33%)

Question 3. Which types of interactions (questions, comments, others) were made in which channels?

We coded three categories of interactions: (a) questions, (b) comments, and (c) other as presented in Tables 3 and 4. Interactions coded as questions were asked by students to the instructor or to other students. Comments are separated into *prompted comments* that were made by students in direct response to the instructor (including answering direct questions) or *unprompted comments* that were offered by students without direct prompt or question by the instructor. Interactions coded as *other* included logistic comments related to technical issues with the LVC, interactions related to course assignments or grading, and social interactions. When

“other” interactions are removed so that only on-task questions and comments are counted, then students still made almost twice as many interactions in text (67%) than verbally (33%).

In addition to categorizing student interactions in the recorded LVC sessions by type, we also categorized interactions as being made in the text channel of the LVC or made verbally—either by onsite students, as recorded by the instructor’s microphone, or by online students using internal microphones in their home computers.

Table 3

Types of Verbal Interactions

Total Verbal interactions (on task)		
215		
Comments 189 (88%)		Questions 26 (12%)
Unprompted 35 (16%)	Prompted 154 (72%)	

Table 4

Types of Text Interactions

Text interactions (on task)		
421		
Comments 298 (71%)		Questions 123 (29%)
Unprompted 85 (20%)	Prompted 213 (51%)	

Tables 3 and 4 show that students much preferred to ask questions in text rather than verbally. Our post-course interviews revealed that students liked being able to ask a question at the moment it occurred to them, and without interrupting the instructor’s lecture. Students made comments more than they asked questions in both verbal and text modes. Most prompted comments represented responses to questions directed by the instructor to individual students or to the class. Unprompted comments—meaning comments that students offered without being directly prompted or “called on”—were made in both text (20%) and verbal (16%) modes, with a slightly higher percentage of unprompted comments made in the text mode. Students interviewed after completion of the course indicated that they liked to “throw out” short text comments and would raise their hand (literally or virtually) to make more extensive verbal comments.

Discussion and Implications

Synchronous and asynchronous online learning can complement each other in a variety of blended or hybrid formats. In the graduate course that was the subject of this study, for example,

the recordings of LVC class sessions allowed students to attend asynchronously if they preferred or if they missed a class, or to review sessions in order to clarify what they missed or did not understand. This capability to review class sessions may be especially important to international students who sometimes have difficulty understanding what the instructor and their peers are saying. Being able to review class recordings is essentially an attribute of lecture capture rather than a unique attribute of synchronous LVC interactions and so is not our primary interest. However, the course instructor maintained that the LVC lecture recordings were more “lively” because of being delivered to students than they would have been if recorded by the instructor specifically to post on the course LMS for asynchronous access by learners.

Although this study investigates a rather unique blending of online and onsite students, it highlights text-based chat as an LVC feature that supports a new and potentially valuable pedagogical method: *integrated text interaction during lecture*. Integrated text interaction during lecture shares some characteristics of the *backchannel* that is increasingly used in the context of conference presentations. While discussion of backchannel use in conference presentations often focuses on “snarky” comments, the format also engages audiences inside and outside of the meeting room as never before (Atkinson, 2010). Chat box exchanges between students appear to facilitate learning by allowing students to address other students’ questions and comments without interrupting the instructor’s lecture, as can be seen in this chat box exchange between students during an LVC lecture session that came after students had provided each other with peer formative evaluation of multimedia tutorials they had produced:

Tonya: I really appreciate very specific feedback. Grammar, spelling, and bad links are easier to fix than general like or dislike comments.

Ahmed: Grammar is difficult so having feedback is helpful

Jessica: We used the feedback we got. It was all pretty positive and I agreed with a few comments

Matt: I did have some trouble with slides going to the wrong place that was pointed out.

Tonya: Even when we decide to not do changes suggested in FE, the feedback is helpful because it makes us think about what we are doing.

Missy: it was very doable with the template and the partner

Tonya: I am surprised that the text boxes are a slightly different shape than we made. Is that a Mac/PC thing?

Liu: it is a mac

Tonya: The mac shows the shape boxes different than they looked on our PCs.

Tonya: I guess that is something we need to be aware of.

The unique aspect of this study is that it did not separate students into onsite and online conditions; students participated in both modes at various points in the semester. The students' comfort level and preference for text interaction, then, argues for the use of backchannel in seated as well as online courses. Both the instructor and students interviewed after the course agreed that many of the comments and questions made in the chat box would simply not have been made during typical classroom lecture. On the other hand, as noted by Pullen (2004), students tended to opt for the verbal mode when they had a "story" or longer comment to offer.

In our discussion, we resist directly comparing LVC to either face-to-face or asynchronous learning environments because the action research approach doesn't support or aspire to generalizable results. However, the analysis of these two offerings of a graduate-level instructional multimedia design class can potentially inform the design decisions of instructors who are considering incorporating synchronous online class sessions into their face-to-face or online courses. Indeed, the instructor made several changes in the course based on this study's findings that may inform others' design decisions.

While the instructor offered students the choice of attending class sessions on site or online, he was concerned that the trend toward increasingly online participation might eventually lead to on site attendance dropping below a level he considered necessary for lively interaction. To incentivize on site attendance, the instructor designed a three-tier scheme of participation points for future offerings of the course. Each student would be required to generate 15 participation points per week, with 5 points earned simply by attending on site. Participation points would be awarded for questions or comments contributed by either on site or online students in the LVC, and remaining points would have to be earned through participation in the weekly asynchronous discussion board through the course LMS. Time-shift students who watched the LVC recording rather than attending "live" would need to earn all 15 participation points in the asynchronous discussion.

In response to analysis of the types of student interactions as well as interviews with students, the instructor planned to require future online participants to have and use a microphone so that he could "call on" them for more elaborated verbal responses as often as he called on students in the classroom. On the other hand, the instructor came to greater appreciation of the value that chat-box text interactions had and determined to further cultivate the use of this "backchannel" during his PowerPoint-based LVC lectures by awarding participation points.

The blended onsite/online format may grow in popularity as a way to extend on-campus graduate classes to students who cannot make it to campus for classes. However, growth in LVC use is more likely to come in the blending of synchronous online sessions with more typical asynchronous instructional activities in a fully online format. That is, students in fully online programs may increasingly be invited (or expected) to participate in some synchronous class sessions, or at least to asynchronously view recordings of live sessions. As online students, instructors, and administrators strive to improve interaction in online learning they should consider how to take advantage of LVC features such as session recording and chat.

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