Chapter XIX

Adopting Tools for Online Synchronous Communication:

Issues and Strategies

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Abstract

This chapter considers some of the issues related to the adoption of online synchronous communication tools and proposes strategies to help deal with these issues. Two contrasting contexts of use of online synchronous tools are described. In one context, audio-conferencing using Elluminate LiveTM is highlighted, in the other, video-conferencing using iVisitTm. Issues related to use of these tools for synchronous communication are considered from the perspective of relative advantage, compatibility, and complexity. The advantages included the immediacy, spontaneity, intimacy, efficiency, and convenience of communication. Complexity manifested itself in relation

to time
management, shifting and evolving technical and pedagogical needs, and changes in instructors' roles. Compatibility issues included the demands on instructors, lack of freedom from temporal constraints, and difficulties with communication across time zones and when multi-tasking.

Introduction

For many students and teachers, the transition to e-learning or online learning has involved moving from a form of communication that is synchronous, real-time, and face-to-face, to one that is asynchronous, in delayed time, and text-based (Zemsky & Massy, 2004). This transition has resulted in flexibility related to any-time any-place learning (Oblinger & Maruyama, 1996), increased opportunities for reflection (Harasim, 1993; Heckman & Annabi, 2003; McComb, 1993), equality of participation (Ortega, 1997; Warschauer, 1997), and easy archiving of communications (Collis & Moonen, 2001; Harasim, Hiltz, Teles, & Turoff, 1995). Likewise, the transition has been accompanied by challenges such as loss of non-verbal cues (Burge, 1994; Kuehn, 1994; Mclsaac & Gunawardena, 1996; Weatherley & Ellis, 2000), possible decrease in social presence (Anderson, 1996; Tu, 2002), lack of interaction (Guzdial & Carroll, 2002; Oliver & Shaw, 2003), lack of spontaneity and immediacy in communication, and feelings of isolation (Abrahamson, 1998; Badger, 2000; Besser, 1996; Brown, 1996; Tiene, 2000),

To avoid, compensate for, or overcome these challenges, institutions can complement the asynchronous aspects of e-learning with an online synchronous component. Synchronous communication occurs in real time with participants simultaneously, remotely connected to one network. In the past, this form of communication has typically privileged text-based chat. More recent synchronous learning environments combine features and tools such as audio, video, chat, whiteboards, polling features, and breakout rooms.

Text-based forms of synchronous communication have been the focus of numerous studies (see Baron, 2004; Jacobs, 2004; Murphy & Collins, 2000; Nicholson, 2002; Schwier & Balbar, 2002). There have also been a number of studies of video-conferencing (see Alexander, Higgison, & Mogey, 1999; Hearnshaw, 2000; Gage, Nickson, & Beardon, 2002) and of audio-conferencing (see Hampel & Hauck, 2004; Moore & Kearsley, 1996). However, the newer synchronous learning environments have yet to receive equal attention in the literature.

Knolle (2002) argues that investigation of contextual use of real-time technologies is necessary to provide guidance to instructors who are struggling to use

these technologies. Online synchronous communication has the potential for numerous benefits including real-time interaction (Hoffman & Novak, 1996), perception of social presence (Blanchard, 2004), and sense of community (Schwier & Balbar, 2002) and immediacy (Garrison, 1990). The potential for benefits or advantages, however, does not guarantee that they will actually occur. For example, Rafaeli and Sudweeks (1997) noted that while interactivity might be possible, it was not always exercised. Even in cases where the advantages may actually be realized, there may be other disadvantages depending on the tools used for synchronous communication. These tools may be quite complex and require extensive support. In other cases, their integration into existing courses or other contexts may result in incompatibility with the teaching and learning activities or strategies already in place.

This chapter considers some of the issues related to the adoption of online synchronous communication tools. It also proposes strategies to help deal with these issues. Two contrasting contexts of use of online synchronous tools are described. In one context, audio-conferencing using Elluminate *LiveTM* (EL) is highlighted, in the other, video-conferencing using iVisitTM. Both technologies will be of interest to postsecondary institutions considering using synchronous communication tools either as an addition to asynchronous learning or to support remote collaboration among geographically-dispersed individuals. Both technologies operate in low-bandwidth environments, which will be of benefit in cases where the student users do not have high speed access. In addition, iVisit allows for compatibility between Mac and PC users and supports multi-party desktop conferencing. EL is also Mac and PC compatible and will be of particular interest to institutions considering replacing teleconferencing with a Web-based alternative.

The EL case, although only a small pilot, provides insights into the experiences of university instructors who are experimenting with new online technologies for the first time. The case of iVisit, although situated in an elementary and secondary context, provides an illustrative case of a large-scale implementation with 432 hours of video-conferencing activities in one year, including involvement by 13 school districts, four universities, 50 schools, and more than 11,000 iVisit connections. As with the case of EL, teachers' experiences with iVisit offer insights into the types of issues faced when transitioning from face-to-face to e-learning.

Issues related to use of these tools for synchronous communication are considered from the perspective of Rogers' (1995) framework for the adoption of innovations. Rogers highlighted five characteristics of innovations that accelerate and facilitate their adoption: relative advantage, complexity, compatibility, trialability, and observability. Relative advantage refers to the degree to which individuals perceive an innovation as advantageous. Compatibility refers to the degree to which an innovation is perceived as consistent with existing values,

experiences, needs, and practices of adopters. Trialability relates to how easily an innovation might be experimented with on a limited basis by potential adopters. Observability refers to the visibility to other potential adopters of results of an innovation. The case studies reported on here did not focus on potential adopters. For this reason, the analysis is limited to consideration of relative advantage, compatibility, and complexity.

Elluminate *LiveTM:* Memorial University, Newfoundland

During the 2004-2005 academic year, Memorial University decided to adopt EL in order to eliminate costs related to teleconferencing and to support a general shift in the delivery of distance courses to Web-based modes. Featured tools of EL include two-way, half duplex audio, meaning that only one person can speak at a time. There is also text-based direct messaging, application sharing, a whiteboard, polling feature, a graphing calculator, and break-out rooms. Users require a headset and microphone.

All instructors teaching distance courses in the winter semester 2005 were invited to use the technology. The 10 instructors who opted to use the technology were offered training. Support personnel were available for every session to deal with any technical problems. Following the implementation of the pilot, eight of the instructors participated in a one-on-one, face-to-face, semi-structured interview designed to gain insight into their experiences using the technology. Interview questions focused on how they used the technology, their perceptions of the advantages of EL, the challenges they faced, and their plans for future use. Each interview lasted approximately 45 minutes and was subsequently transcribed and then analyzed in relation to Rogers' framework.

Relative Advantage

An advantage of EL was its convenience compared to teleconferencing. As one instructor explained, "With teleconferencing people had to go to a site where the teleconferencing was available. This allowed them to at least stay in their own community or even in theifown homes." The immediacy of communication was also cited as a benefit. Instructors referred to the value of "spontaneous discussion," "spontaneous direct talking," and "spontaneous interaction." One instructor highlighted the value of immediate, spontaneous interactions in a context of student presentations using EL, noting that it "comes very close to

being able to do
what I do in a face-to-face classroom [in terms of] immediate feedback, questions, and answers." One instructor described EL as a tool that contributed to a "sense of community" that captured "the closeness [and] some of the intimacy you can have in a face-to-face environment."

Instructors referred to opportunities for "making the people come alive," for "hearing the voices," and for creating a "more meaningful, purposeful experience for my students." They observed a "greater sense of intimacy," a "greater sense of knowing," and of feeling "more connected to" students. They liked the fact that the technology allowed them to communicate verbally with students. Likewise, students could "talk to each other and hear each other's voices." One instructor described how a "little more of the person was able to come through in the voice," which gave him a sense of knowing his students.

Another individual highlighted how the use of synchronous tools within an asynchronous environment offered more instructional choice and variety in teaching modes. The ability to record any class sessions and post them for later retrieval was identified as an added feature not available in a live class: "It's all there, and they can record it, they can play it again this evening." Another benefit was the efficiency of synchronous compared to asynchronous communication. One instructor commented, "It's more efficient for me. I don't have to read a hundred postings."

Complexity

Issues of complexity largely involved technical difficulties encountered. EL requires users to install software on their computers prior to use. This installation proved "to be the biggest hassle" that students faced. As a result, "some of them even avoided doing that by not having it put on their computers at all, and came to the University instead." Other students experienced challenges with the two-way audio component: "There were always some [students] who couldn't get on due to some technical problem. Their mike wasn't working." Other students experienced problems with their speakers: "[A]s we were even answering questions sometimes students were saying 'I can't hear you or I can't understand' or their machine would go dead and they wouldn't hear that answer."

Complexity was also evident in the need to become comfortable using new tools in a new context. In relation to the whiteboard, one instructor commented as follows: "I wasn't very comfortable using it...I didn't have time to figure out how to do it." In order to manage the complexity of the adoption, support was provided for every session by Distance Education Learning Technologies (DELT), the division of the university responsible for the pilot. As one instructor explained, some problems were handled by taking students "out of class": "If someone developed a problem while the session was in progress, they would take them to

a breakout room and
try to deal with it." In other cases, technical difficulties were handled by contacting the students directly: "We had the DELT people here all the time, and they would sometimes phone students at home and try to help them at home."

Success of the adoption depended on dedicated technical support for students who were experiencing difficulties with the technology. One instructor described this support as vital: "If he hadn't been there, I think it would have been a very bad experience because the students would have been very frustrated because they couldn't get into the system. I had no idea how to help them." Support not only ensured that technical problems could be effectively resolved, but also played an important role in terms of reassuring instructors; one individual explained, "I don't feel terribly confident with the technical aspects of it, and I'm always very appreciative of having support people in place."

Compatibility

The issue of compatibility manifested itself primarily in terms of adding synchronous communication to an otherwise asynchronous course. One instructor argued that the "anytime, anyplace asynchronous mode" was the "real advantage of distance and Web-based learning." He added: "When you introduce Elluminate Live, you're staying with the anyplace to a large extent, because anybody can download this stuff, but you're taking away the anytime."

The issue of compatibility became even more obvious in cases involving communication across time zones. One individual observed: "The three sessions were scheduled with everybody in the country having to log on at the same time, which was a bit of a problem when you are in B.C. [British Columbia]" Similarly, another person noted: "This kind of synchronous activity becomes a real burden when you've got students in Badger and Vancouver or even Calgary or anywhere across the country."

Recognition of the constraints and complications from communicating across time zones combined with the lack of freedom from temporal constraints led one instructor to caution others in their use of EL: "You have to be careful. Use it by all means, but you've got to use it for very explicit purposes and limit the sessions." Another offered similar advice: "If we're going to use EL, we need to let people know well in advance that it's going to be used." In some cases, instructors made participation strictly voluntary while, in others, they decided that "if people missed, there were no marks deducted." Some instructors got around the issue of scheduling by simply using the sessions for office hours: "I didn't want to force them to be in a place at a particular time. That takes away from the asynchronous nature of the course. So I just used it for office hours."

Compatibility also manifested itself as an issue in relation to time. One instructor described EL as something "very time-consuming" added "on top of reading the communication and correspondence from the asynchronous component of the course. One reaction to the demands on time caused by using EL was to reduce the number of weekly sessions from two to one.

Besides issues related to time management, communication across time zones, and voluntary or mandatory participation, use of EL also raised issues of compatibility with current practices. Adopting new tools meant that instructors had to become used to communicating using multiple channels at the same time. The main channels of communication available in EL included two-way audio and direct messaging. Simultaneous management of both modes of communication was not something all instructors were necessarily comfortable with, as the following quote illustrates: "The main challenge I found was moderating two or three activities: the text messaging, the verbal thing, giving them the mike checking to see whose hand's up... At the same time, I'm talking, responding to their verbal messages."

Compared to other forms of electronic synchronous communication, such as teleconferencing, EL placed extra demands on the moderators since "there were more things to multi-task on at the same time." One individual described how he had to divide his attention between "the student list, plus, the typed-up notes they send not only to me but to each other, plus the white board." The use of direct messaging emerged as the tool least compatible with instructors' current practices. In some instances, the unrestricted use of this tool by students resulted in "more distraction in some ways because of the side conversations that were going on."

iVisitTM: Laval University, Quebec

During the 2004-2005 academic year, a research and intervention team engaged in Phase II of "Projet l'ecole eloignee en reseau" (The Remote Networked Schools Project). An iVisit server provided 600 access codes and passwords to teachers, students, and other university and school personnel involved in the university-school partnership. Another server was dedicated to asynchronous communication through the use of Knowledge Foruem, which is a group workspace designed to support knowledge building. These two online collaborative tools were critical features in the design of the project. The adoption of iVisit was based on two criteria: flexibility of use and low-bandwidth demand in comparison with other multi-site video-conferencing systems. Featured tools include dedicated rooms, a "push-to-talk" button, and a text-based chat window.

Users require a microphone, but headsets are not necessary unless online traffic results in poor sound quality.

In Phase I of the project (2002-2003), 18 classes in 10 sites carried out 24 different collaborative learning activities using iVisit. Of the 432 hours of video-conferencing activities, 110 were observed systematically to establish how the tool was used. Three different raters observed directly the human interaction occurring on iVisit. Using the software Camtasia, they recorded on a random basis 20 hours of conversation for the purpose of analysis. Ninety-one semi-structured interviews were conducted with students, teachers, school principals, and school district technology personnel and administrators. Interviews were conducted using the telephone or iVisit and lasted 30-40 minutes.

In Phase II (2004-2006), project participants were distributed among 13 school districts and four universities. There was participation by over 50 schools with more than 11,000 iVisit connections by the Spring of 2005. Teachers were invited to use iVisit in combination with Knowledge Forum to support collaborative learning and knowledge-building activities. School district personnel provided basic training and technical support. University-based personnel provided justin-time technical and pedagogical support and feedback on demand The following is an analysis of the results using Rogers' framework.

Relative Advantage

In Phase I, video-conferencing through iVisit was the tool preferred by all interveners who already had broadband access in their workplace. This tool allowed them to see each other in real time and also to communicate with several people simultaneously. Video-conferencing was used both inside and outside the classroom (e.g., by school administrators, counsellors, mentors, experts, and teachers).

As indicated in the Phase I Report (Laferriere, Breuleux, & Inchauspe, 2004), synchronous communication through iVisit helped them overcome professional isolation, team up with colleagues, and provide professional services at a distance. One school principal with two small schools 20 miles apart conducted meetings with the professional staff of the two schools joined through video-conferencing. Principals of schools hundreds of miles apart participated in school district meetings using iVisit.

In Phase II, just-in-time professional development using synchronous communi-cation became a characteristic of the project. There was always someone present online in the iVisit Coordination Room to help teachers with the planning or conduct of online collaborative learning activities and projects. Meetings could also be scheduled ahead of time through asynchronous (e-mail) or synchronous

(Internet chat: MSN Messenger) communication and conducted in a specific virtual iVisit Room.

Ten distinct professional development activities using iVisit as a support for synchronous communication were identified in Phase I: software training, networking of participants, partnership development, planning and coordinating online educational activities with students, getting started with online learning activities, educational aid, delocalized teamwork, mentoring, emotional support, and immediate solution to or reproduction of technological problems. Onsite and online teacher-teacher interactions were observed to be of a collegial nature and provided opportunities for both informal and non-formal professional development activities.

Complexity

At the outset of the project, teachers were convinced that their tasks in a networked classroom would be more demanding After participating in Phase I, their thinking on this matter had not changed. However, after Phase I, the demands and the support that teachers called for had been pinpointed. One of these demands related to the management of time and of learning achieved in conjunction with projects. Teachers identified a need for facilitating conditions such as technical and pedagogical support; readily available equipment; release from normal tasks to engage in certain collaborative activities; and flexible scheduling. These demands and needs were given more attention in Phase II. Technical support was offered to deal with complexity at the technical level. As capacity-building increased in classrooms, technical support was reduced and pedagogical support increased. At the same time, the need to focus on learning outcomes resulted in pressure on school principals and teachers.

Phase I teacher interviews, which focused on teachers' beliefs at the beginning and at the end of the year, revealed that some beliefs, although maintained, had broadened and become more complex. For instance, at the outset, the students' socialization was deemed necessary for their education. At the end of Phase I, teachers still believed this, but socialization was now considered integral to the learning process itself. Teachers also believed that they needed to be present in a networked classroom, but went beyond evoking a simple presence and focused on roles (including that of a leader) that must be exercised in this new situation.

Some new beliefs that implied a more complex understanding of their work also emerged. These included recognition of the importance of collaboration in the delocalized school through networking and the benefits derived from it; the discovery of the ability of students who were previously less independent and motivated to work in a network to get involved and make decisions; and the discovery or bolstering of an essential belief (i.e., that students learn actively).

In this context of use, complexity involved a change in the role of the teacher and the learner in a networked classroom.

Compatibility

Online synchronous communication for collaborative learning using iVisit also challenged existing instructional practices. For instance, secondary school teachers were more resistant to using iVisit to support student-to-student synchronous communication for learning purposes than were elementary school teachers, and they were generally less likely to engage in constructivist, student-centered, and knowledge-building pedagogies. The secondary school teachers had to reduce the time they lectured to students in order to use iVisit. The lack of time was frequently noted as a concern, and the school schedule was identified as problematic. For these teachers, using iVisit to engage students in activities such as negotiating meaning was identified as incompatible with existing practices.

Issues

As these two contexts of use illustrate, online synchronous communication can present numerous advantages, some of which actually temper or attenuate the disadvantages associated with asynchronous communication. The advantages include the following: immediacy, spontaneity, intimacy, efficiency, and convenience of communication; opportunities for more instructional choice, more tools, networking, partnership development, planning, implementing, and coordinating educational activities; and opportunities for delocalized teamwork, mentoring, and both informal and non-formal professional development activities.

These advantages offer a compelling rationale for the inclusion of synchronous forms of communication in otherwise asynchronous contexts of learning. Of particular importance and interest are the advantages relating to the capacity of synchronous tools to offer communication experiences that replicate features of face-to-face contact. For some instructors and students, these advantages may facilitate the transition to e-learning.

These advantages do not, however, obviate the issues that can arise in the use of synchronous tools. In the case of use of EL, lack of comfort with technology was the most important issue. This issue may pose a barrier to attempts to use new forms of learning. The advantage of EL and iVisit is the many features and tools offered to users. However, if students and teachers do not know how to use these tools, then the advantages may instead result in limitations. In the EL case,

comments regarding the use of the whiteboard and direct messaging suggest that, in spite of initial training sessions, instructors may not make full or effective use of these tools. The experiences of instructors and students also emphasized the role of support in the adoption of new and complex tools. Without this support, the transition to the use of new e-learning tools may fail entirely.

In the case of use of iVisit, issues of complexity were numerous and varied. Some of the issues were related to time management and support in the form of a release from normal tasks or flexible scheduling to engage in collaborative planning. This issue indicates how the transition to e-learning can necessitate systemic changes that involve not only the instructors and students, but administration as well. The issue of the need for technical and pedagogical support and equipment reveals the fine balance that must be achieved in the transition. As the need declined for technical support, the need for pedagogical support increased. This situation shows how instructors' needs do not remain static but shift and evolve. These changes in need highlight the importance of monitoring the adoption of new tools to ensure timely and appropriate training and professional development. The experiences of the participants in the iVisit case also made evident how roles may need to shift when new forms of communicating and collaborating are adopted. This need to shift may give rise to confusion, if not carefully managed or understood by all.

Compatibility issues related to the use of EL and iVisit included the demands that their use placed on instructors, the lack of freedom from temporal constraints, and difficulties with communication across time zones. The issue of demands placed on instructors made evident that the transition to e-learning in this case was interpreted as an extra demand placed on top of existing workloads. Instructors and teachers perceived the use of the synchronous communication as an addition of one mode on top of another and not simply a shift from one mode to another. In the case of iVisit, the time demands even resulted in some resistance to use of the technology. While communication across time zones was not an issue in the case of iVisit, it placed some limitations and restrictions on activities in the case of EL. In general, some instructors perceived the use of synchronous technology as incompatible with the anytime advantage of online or e-learning. This issue made evident the need for institutions and instructors to make decisions about their goals for e-learning before they adopt particular tools.

The issue of multi-tasking with use of direct messaging highlights how the new e-learning environments can require instructors to adopt new behaviors and new ways of working and communicating. The issue points to the need for institutions to be aware of and put in place opportunities for instructors as well as students to develop strategies and techniques that allow them to appreciate and take advantage of new tools and new ways of interacting in e-learning environments.

The case of iVisit made evident the change that new forms of online communication may require, not only in teaching practices, but also in teachers' beliefs. The experiences of some of the teachers using iVisit highlighted the link between new tools and new practices. Their lack of comfort with constructivist, student- centered approaches, and practices can serve as a reminder that the transition to e-learning involves not only a technical leap, but a pedagogical one as well. In terms of the latter, adopting new tools may require philosophical changes in relation to instructors' beliefs about the nature of learning.

Strategies

The experiences described in these two cases suggest that the transition to new forms of e-learning using synchronous communication tools such as EL and iVisit offers many advantages. The experiences also suggest that this transition must be carefully orchestrated and managed for those benefits to be realized and for the transition to be successful and effective. The experiences reported in this chapter illustrate how the transition to e-learning with synchronous communication may involve not only the adoption of new tools, but also new beliefs, roles, practices, and new ways of behaving, communicating, collaborating, and of managing time. These changes can be individual as well as systemic and may involve students, instructors or teachers, managers, support personnel, and administrative staff. All of these changes may be more easily accepted if the appropriate strategies are identified and put in place. The strategies relate to technical as well as pedagogical and administrative issues.

Successful and effective adoption of online synchronous communication tools in contexts of teaching and learning will require extensive technical support. This support will be particularly necessary in the early stages of adoption and in cases where users are not familiar with environments supporting simultaneous multi-tool use. For both instructors and students, support should include not only assistance with downloading the software, but also support with use of the various tools and features such as chat or direct messaging, audio, and the whiteboard. Where resources do not allow for high levels of such support, students and teachers could be paired or grouped so that more technically-able users can support those who are less comfortable with the new tools. Additionally, users can be directed to the site of the software where FAQs and technical guidelines may help them solve technical problems. Without this support, instructors may not be able to address pedagogical concerns or issues that may arise in these new learning environments.

In terms of instructors, support needs to extend beyond the technical dimensions of use to encompass the pedagogical or andragogical aspects. The introduction of new tools for communication needs to be accompanied by opportunities for instructors to reflect on their practice and to consider new ways of communicating with students. Where the goal is to make use of the tools to move toward more constructivist and student-centered forms of learning, professional development opportunities could be designed to engage instructors in consideration of best practices, inquiry into beliefs about teaching and learning, and discussion of how teachers and students can maximize the affordances of the tools and provide more choice in modes of learning. Such opportunities could provide instructors with practice in multi-tasking and using a variety of tools at one time.

At the administrative level, use of synchronous communication across time zones with differing schedules and in the context of primarily asynchronous courses may require flexible or alternative scheduling. In some cases, non-mandatory or voluntary participation may be the preferred option. As well, workload demands may need to be diminished, especially at the outset in order to accommodate the addition of a synchronous component.

Conclusion

Given the issues of complexity and compatibility that can arise in the adoption of online synchronous tools in contexts of teaching and learning, the advantages and benefits of such use will need to be highlighted. This recognition may help diminish the importance of the challenges individuals face in transitioning to this his new form of learning. Once individuals witness or realize that these tools allow them to accomplish goals they could not otherwise accomplish, their tolerance of issues related to the complexity and compatibility may well increase.

As use of these new tools and others like them becomes more common, and as individuals continue to become accustomed to working in electronically mediated environments, some of the issues may diminish in importance. Such may be the case with technical concerns. Issues related to pedagogy and andragogy are likely to require more time and attention. To ensure an effective transition to this form of e-learning, instructors, students, designers, and administrators need to carefully consider the issues associated with its use and identify and implement effective strategies to ensure that its advantages are realized.

References

Abrahamson, C. E. (1998). Issues in interactive communication in distance education. *College Student Journal, 32(1),* 33-43.

Alexander, W., Higgison, C., & Mogey, N. (1999). *Case studies: Videoconferencing for teaching and learning.* Retrieved October 25, 2005, from http://www .icbl.hw .ac.uk/ltdi/vcstudies/

Anderson, M. D. (1996). Using computer-mediated conferencing to facilitate group projects in an educational psychology course. *Behavior Research Methods, Instruments, & Computers, 28(2),* 351-353.

Badger, A. (2000). Keeping it fun and relevant: Using active online learning. In K. W. White & B. H. Weight (Eds.), *The online teaching guide: A handbook of attitudes, strategies, and techniques for the virtual classroom* (pp. 124-141). Needham Heights, MA: Allyn and Bacon.

Baron, N. S. (2004). Gender issues in college student use of instant messaging. *Journal of Language and Social Psychology,* 23(4), 397-423.

Besser, H. (1996). Issues and challenges for the distance independent environment. *Journal of the American Society of Information Science,* 47(11), 817-820.

Blanchard, A. (2004). Virtual behavior settings: An application of behavior setting theories to virtual communities. *Journal of Computer Mediated Communication, 9(2).* Retrieved July 1, 2005 from http://www.ascusc.org/jcmc/vol9/issue2/blanchard.html

Brown, K. M. (1996). The role of internal and external factors in the discontinuation of off-campus students. *Distance Education,* 17(1), 44-71.

Burge, E. (1994). Learning in computer conferenced contexts: The learners' perspective. *Journal of Distance Education, 9(1),* 19-43.

Collis, B., & Moonen, J. (2001). *Flexible learning in a digital world: Experiences and expectations.* London: Kogan Page.

Gage, J., Nickson, M., & Beardon, T. (2002). Can videoconferencing contribute to teaching and learning? The experience of the motivate project. *Annual Conference of the British Educational Research Association.* Retrieved October 24, 2005, fromhttp://www.leeds.ac.uk/educol/documents/00002264.htm

Garrison, D. R. (1990). An analysis and evaluation of audio-teleconferencing to facilitate education at a distance. *The American Journal of Distance Education, 4(3),* 13-26.

Guzdial, M., & Carroll, K. (2002). Explaining the lack of dialogue in computer-supported collaborative Learning. *CSCL 2002 Information and Conference Papers.* Retrieved June 22, 2005, from http://newmedia.colorado.edu/cscIJl8.html

Hampel, R., & Hauck, M. (2004). Towards an effective use of audio conferencing in distance language courses. *Language Learning & Technology, 8(1).* Retrieved October 20, 2005, from http://11t.msu.edu/vol8numl/hampel/default.html

Harasim, L. M. (1993). *Global networks: Computers and international communication.* Cambridge, MA: MIT Press.

Harasim, L. M., Hiltz, S. R., Teles, L., & Turoff, M. (1995). *Learning networks: A field guide to teaching and learning online.* Cambridge, MA: The MIT Press.

Heamshaw, D. (2000). Effective desktop videoconferencing with minimal network demands. *British Journal of Educational Technology, 31(3),* 221-228.

Heckman, R., & Annabi, H. (2003). A content analytic comparison of FTF and ALN casestudy discussions. *Proceedings of the 36th Hawaii International Conference on System Sciences.* Retrieved June 22, 2005, from http://www.olnresearch.org/data_files/articles/full_text/heckman03.pdf

Hoffman, D. L., & Novak, T. P. (1996). Marketing in hypermedia computer-mediated environments: Conceptual foundations. *Journal of Marketing, 60(3),* 5068.

Jacobs, G. (2004). Complicating contexts: Issues of methodology in researching the language and literacies of instant messaging. *Reading Research Quarterly, 39(4),* 394407.

Knolle, J. W. (2002). *Identifying the best practices for using HorizonLive to teach in the synchronous online environment.* Master's thesis. California State University. Retrieved October 12, 2005, from http://www.csuchico.edu/—jknolle/research/thesis/Knolle_Thesis.pdf

Kuehn, S. A. (1994). Computer-mediated communication in instructional settings: A research agenda. *Communication Education, 43(2),* 171-183.

Laferrière, T., Breuleux, A., et Inchauspe, P. (2004). *L'ecole eloignie en reseau.* Rapport de recherche, CEFRIO, Quebec. Retrieved July 1, 2005, from http://www.cefrio.gc.ca/rapports/ecole_eloignee_en_reseau_Rapport_final_2004.pdf

McComb, M. (1993). Augmenting a group discussion course with computer-mediated communication in a small college setting. *Interpersonal Computing and Technology: An Electronic Journal for the 21st Century,*

3(1). Retrieved June 22, 2005, from http://www.helsinki.fi/science/optek/ 1993/n3/mccomb.txt

McIsaac, M., & Gunawardena, C. (1996). Distance education. In D. Johnassen (Ed.), *Handbook of research for educational communications and technology* (pp. 403-437). New York: Macmillan.

Moore, M. G., & Kearsley, G. (1996). Distance education: A systems approach view—audioconferencing. In M. G. Moore & G. Kearsley (Eds.), *Distance education: A systems approach view* (pp. 136-39). Stamford, CT: Wadsworth Publishers.

Murphy, K. J., & Collins, M. P. (2000, March). *Communication conventions in instructional chats.* Paper presented at the Annual Convention of the American Educational Research Association, Chicago, IL. Retrieved October 11, 2005, from http://www.firstmonday.dk/issues/issue2_11/ murphy

Nicholson, S. (2002). Socialization in the "virtual hallway": Instant messaging in the asynchronous Web-based distance education classroom. *The Internet and Higher Education, 5(4),* 363-372.

Oblinger, D., & Maruyama, M. (1996). *Distributed learning: CAUSE Professional Paper,* Series #14. Boulder, CO: Cause. Retrieved June 21, 2005, from http://www.educause.edu/ir/library/pdf/pub3014.pdf

Oliver, M., & Shaw, G. P. (2003). Asynchronous discussion in support of medical education. *Journal of Asynchronous Learning Networks, 7(1),* 56-67. Retrieved June 22, 2005, from http://www.aln.org/publications/jaln/ v7n1/v7n1_oliver.asp

Ortega, L. (1997). Processes and outcomes in networked classroom interaction: Defining the research agenda for L2 computer-assisted classroom discussion. *Language Learning & Technology,* 1(1), 82-93.

Rafaeli, S., & Sudweeks, F. (1997). Networked interactivity. *Journal of Computer Mediated Communication, 2(4).* Retrieved June 22, 2005, from http://www.usc.edu/dept/annenberg/vol2/issue4/rafaeli.sudweeks .html.

Rogers, E. (1995). *Diffusion of innovations* (4th ed.). New York: The Free Press.

Schwier, R. A., & Balbar, S. (2002). The interplay of content and community in synchronous and asynchronous communication: Virtual communication in a graduate seminar. *Canadian Journal of Learning and Technology, 28(2).* Retrieved June 22, 2005, from http://www.cjIt.ca/contentivo128.2/ schwierbalbar.html

Tiene, D. (2000). Online discussions: A survey of advantages and disadvantages compared to face-to-face discussions. *Journal of Educational Multimedia and Hypermedia,* 9(4), 371384.

Tu, C. **H.** (2002). The impacts of textbased CMC on online social presence. *The Journal of Interactive Online Learning, 1(2).* Retrieved June 22, 2005, from http://www.ncolr.org/jiollissues/2002/fal1/06/

Warschauer, M. (1997). Computer-mediated collaborative learning: Theory and practice. *The Modern Language Journal, 81(4),* 470481.

Weatherley, R., & Ellis, A. (2000). *Online learning: What do teachers need to know about communicating online?* Paper presented at the NAWEB 2000 virtual conference. Retrieved June 22, 2005, from http://naweb.unb.ca/proceedings/2000/weatherley-ellis.htm

Zemsky, R., & Massy, W. F. (2004). *Thwarted innovation: What happened to elearning and why.* The University of Pennsylvania: The Learning Alliance. Retrieved June 22, 2005, from http://www.irhe.upenn.edu/Docs/Jun2004/ThwartedInnovation.pdf