Deconstructing Videotaped Instruction for Online Delivery: Instructional Design in Reverse

Dr. Jamie S. Switzer
Colorado State University Department of Journalism and Technical Communication, USA
jamie.switzer@colostate.edu

Dr. Peter B. Seel
Colorado State University Department of Journalism and Technical Communication, USA
pete.seel@colostate.edu

Dr. Karen Kaminski
Colorado State University Division of Continuing Education, USA
karen.kaminski@colostate.edu

Summary

This paper examines a project in which videotaped face-to-face class sessions were converted into interactive instructional modules for Internet delivery. The development of the online class involved the challenge of teaching the advanced Microsoft Office Suite – normally skills learned hands-on – to distance learners. Sixteen interactive modules were eventually produced by using a process the authors describe as the instructional design in reverse. This paper discusses the importance of the proper application of instructional design theory, the actual production processes used for developing the modules, and important lessons learned in working with interactive multimedia course content for online delivery.

Keywords: Distance Learning, Educational Technology, Instructional Design, Interactive Multimedia, Multimedia on the Internet, Online Learning

Introduction

In an era of reduced budgets for higher education and related constraints on the physical expansion of campuses, university leaders in the United States are rapidly implementing distance education via the Internet as a method of reaching new student populations. The expansion of university online course offerings in the last few years has been dramatic. Distance

education offers many significant benefits to the learner. Four are salient: the ability for the learner to participate asynchronously around life and work schedules; the capability to pace the instruction according to the student's abilities and learning styles; the delivery of content in multiple instructional modalities to enhance student learning; and the ability to participate in university courses without the need to travel to the campus.

The flexibility of online education offers many advantages compared to older instructional delivery technologies such as basic correspondence courses, "roll and scroll" type non-interactive online courses, teleconferencing, televising courses live, or mailing videotaped copies of lectures to students around the world. Utilizing learning management systems as the platform for course delivery via the Internet, instructional content can be presented as plain text with embedded images, as narrated PowerPoint lectures, as animations, as downloaded and/or streamed video segments, and as downloaded and/or streamed audio files. The technology also provides greatly increased potential for interactivity in online distance learning.

This paper examines a project in which existing videotape of live face-to-face class sessions was repurposed and converted into instructional modules for Internet delivery using a learning management system. The development of the online class involved the challenge of teaching the advanced Microsoft Office Suite – normally skills learned hands-on – to distance learners. Sixteen modules consisting of text, audio segments, embedded computer screen shots, and streaming video were eventually produced. This paper discusses the importance of the appropriate application of instructional design theory when developing Web-based courses. However, in this instance, the methods used for developing those modules were actually what the authors called the instructional design process in reverse. This provided the opportunity to learn important lessons about working with multimedia course content for online delivery – primarily how critical proper instructional design is to developing coursework for the Internet, and how difficult the process is when those theories and principles are not followed.

Instructional Design Theory and Process

In response to increasing demands from society and industry, institutions of higher education are developing a rapidly-increasing number of Web-based curricula (Zafeiriou, Nunes, & Ford, 2001). Advances in technology have also helped to drive the explosion of available online offerings by colleges and universities. Nearly one million students in the United States alone were enrolled in all-online education programs at the end of 2004 (Carnevale, 2005). Unfortunately, not all Internet-based courses are created equal. Simply transferring lecture notes to a Web page is not an effective way to deliver instruction; instead, the focus should be on utilizing technology to its fullest in the most appropriate way possible to produce the desired outcome (Gillespie, 1998).

As Mellon states, "...the term technology incorporates all the components needed to ensure effective delivery of instruction" (2000, p. 30). Clark (1994) claims there are two definitions of technology: design technologies by which instructional strategies are determined, and delivery technologies by which instructional strategies are presented to the learner. Both definitions are viable in the context of Web-based education. The process of determining those design and

delivery technologies is known as "instructional design." Research findings on best practices in the areas of user-centered design, usability, and human-computer interaction are also incorporated when designing and implementing Web-based instruction (Mehlenbacher, 2002).

When creating an online course, it is critical that established instructional design theories and principles be followed. Instructional design is the systematic method of planning, developing, evaluating, and managing the design of a course to ensure that students learn in the most effectual fashion (Morrison, Ross, & Kemp, 2001). There are many, many different theories of and approaches to instructional design (Gustafson & Branch, 1997; Leshin, Pollock, & Reigeluth, 1992; Morrison, Ross, & Kemp, 2001). Regardless of the specific method employed, the instructional design process is complex, with many different elements combining and working together to create the best possible learning environment and provide students all the tools they need to be successful in a course. There is interdependence among all stages of the instructional design process.

A critical part of that process is the choice of technology used to present the content. The selection of media influences all the other aspects of the instructional design process (Leshin, Pollock, & Reigeluth, 1992). Bates (1995) has developed a list of criteria to consider that can help determine which technology would be the most appropriate given the circumstance:

- Access to the technology
- Unit cost per learner
- Desired instructional approaches
- Interactivity and user friendliness
- Organizational issues

Because of the nature of the Internet, the choice of media used in Web-based courses is particularly important in the instructional design process.

Additionally, bandwidth limitations constrain the way content can be presented in Web-based courses (Somekh, 2001). Text-only courses are easily accessible using just a dial-up connection, yet are not the most effective method of instruction. The lack of multimedia elements (such as video) can foster an environment of isolation for the learner. Full-motion video can give students more of a face-to-face type of classroom experience. But to deliver a course using that type of medium necessitates that students have access to a high-bandwidth/broadband Internet connection (Webster & Hackley, 1997). Another option would be to include a videotape, CD, or DVD in addition to the online instruction to compensate for lack of bandwidth (Berge, 1998). Therefore, instructional designers must balance practical issues such as bandwidth with the ultimate goal of using the most appropriate technologies to create and deliver a high-quality Web-based course.

One way to achieve this goal is by the judicious use of multimedia. Designed and applied properly, the use of multimedia in online education can be a very effective tool in delivering instruction. According to Bruning, Horn, and PytlikZillig, (2003), humans possess separate information-processing channels for verbal and visual material. Mayer (2003) has also shown

that students learn better from well-designed multimedia presentations than from text- or verbal-only messages. Thus, an environment utilizing static or dynamic visuals and audible sounds along with the printed word can be quite conducive to the learning process.

It can be tempting to incorporate a considerable amount of multimedia into a Web-based course. However, there is the bandwidth issue to consider; multimedia has the potential to require a large amount of bandwidth. Additionally, research has shown that too much visual and aural stimulation is a distraction and hinders learning. Too many Web-based courses emphasize glitz rather than quality, with the content presented as if in a multimedia enhanced textbook (Hedberg & Sims, 2001). The challenge, then, is to design an effective online learning environment using the appropriate technology to achieve the educational goals of each specific course.

Project Overview

Development of the online courses analyzed in this case study occurred at a U.S. university in the Rocky Mountain region. The university is a recognized leader in distance education and a pioneer in the delivery of videotaped instruction to off-campus distance learners. Hundreds of thousands of hours of videotaped materials have been successfully distributed to distance learners in all 50 U.S. states and in many other countries worldwide since the inception of the distance degree program in 1967. As technology evolved, additional media such as DVDs and the Internet are now also used for delivery of instruction. In the past five years alone, faculty and staff at the university have developed over 100 courses for online delivery to distance students.

The university's Information Science and Technology Center and its Office of Instructional Services received a substantial grant to convert nine courses for online delivery. The courses were part of a campus-based Interdisciplinary Studies Program in Information Science and Technology. The funding agency believed the courses would be valuable for information technology students as well as for employees in the workforce needing to retool their professional skills, and supported the development of the courses for online delivery. The nine courses were developed over a two-year period.

Problem and Context

The instructional design team consisted of the three authors of this paper, who were the co-principal investigators and managers of the project; a course designer, who prepared the courses for online delivery by assembling and coding the multimedia content; a student staff member, who assisted the course designer; and the course faculty or instructor, who were the content experts. Development of the first several online courses funded by the grant proceeded smoothly until the advanced Microsoft Office skills course was scheduled to be developed for online delivery. Titled "End User Computing," the on-campus class consisted of fifteen weeks of instruction, much of it taught hands-on in an "instructor shows-student repeats" style. The instructor would demonstrate a particular feature of the software, which was projected onto a screen at the front of the classroom. Students would then perform a specific task using the

software on their laptop. The challenge was to convert this hands-on skills class into a Web-based course.

Web-based instruction is comprised of three stages: design, development, and delivery (Wiens & Gunter, 2002). Many things can affect that process, including communication breakdowns between designers and subject matter experts because of different background knowledge (Keppell, 2001) as well as political influences in institutions of higher education (Christensen, Dunnagan, & Tennyson, 1998; Finkelstein, Frances, Jewett, and Scholz, 2000). Due to circumstances beyond the control of the instructional design team, proper instructional design processes and principles that the literature dictates, such as working through those three stages, could not be followed to create an educationally sound online course. There was conflict between the faculty and the instructional design team, and that tension was exacerbated by the political climate of the institution.

Faculty have a great deal of autonomy at this particular university in determining online course content, media, assessment tools, and delivery modes. However, this freedom and flexibility sometimes makes it very difficult and challenging for the instructional design team to promote the use of tried-and-true instructional design practices. Ideally, faculty should actively engage in consultation and development with the instructional design team to ensure the quality of the distance education experience (Foshay, 2001). That did not happen in this case, which was the beginning of the conflict that would plague the entire project.

From the very start of the process, the instructor was adamant she would only teach the on-campus version of the course, insisting that the live instruction be videotaped to provide the content for the distance course, and that she would not work with the instructional design team to properly develop the online version of the course. The administration deferred to her decision. The institutional culture created a political environment such that the requests, recommendations, and suggestions of the instructional design team regarding this particular course were routinely contested or ignored. This caused a tremendous amount of friction between the university administration, the instructor and the instructional design team. While it is true that instructional designers play a complex role by both leading and by assuming a supporting, subordinate, position, "without the technical and pedagogical knowledge from the instructional designer, a course with good content (from faculty or subject matter experts) will not succeed on the Web" (Pan, Deets, Phillips, & Cornell, 2003, p. 294).

Methodology

Stake (1995) believes the case study approach is useful in furthering the understanding of a particular problem, issue, or concept. Single-case research design is valuable if the individual case is extreme or unique, or unusually revelatory (Yin, 1989). Yin also argues a case study strategy is preferred when seeking answers to "how" questions, when the object of study is a phenomenon in a real-life context, and when the researcher had little control over the events being studied – all of which are present in this particular circumstance.

The authors chose a case study approach to describe in this paper how they were able to create an effective online course even though they were forced to approach the instructional design process in reverse (as discussed in the next section). As participant observers, the case study method allowed the authors to make direct interpretations of the issues and the solutions surrounding the problem. The unique challenges particular to this project provided the rationale for choosing the case study approach. The authors had to determine how to repurpose existing video for delivery online. Proper instructional design principles as guided by theory were not followed, due to circumstances beyond the instructional design team's control as previously explained. The design team had to work within the context of the existing conditions, which were less than ideal in terms of instructional design, and repurpose pre-taped instructional video to produce the online course.

The Instructional Design Process in Reverse

In this project, the instructional design team had to work with what little the instructor was willing to provide: the previously videotaped lessons from an on-campus class. It was not possible to bring the instructor into a studio to videotape the modules one at a time (she refused), so the course developers had to work with videotapes shot while the course was taught live, face-to-face, in an on-campus classroom. This was obviously not an ideal solution for eventual course distribution on the Internet for a variety of reasons, not the least of which was the extensive post-production work that would be required to reformat the instructional multimedia content, which included text transcription, audio and video editing, and the creation of many screen shots of the software.

Dick, Carey and Carey's (2005) systematic design model outlines distinct yet interrelated phases to the development of an instructional program, three of which are relevant here: assessment, analysis, and design/development. Typically the assessment and analysis processes begin with a meeting between the instructional design team and the instructor to determine, among other things, the desired educational outcomes, what course content needs to come from the instructor personally, what media should be used so that the content could be presented visually to best maximize the benefits of the online environment, and what content can be found in other resources. Design and development work then begins on the various course components after the assessment and analysis phases are complete. In this case, instead of meeting with the instructor to determine the ideal methods and media for presenting the course content to distance learners via the Internet, the instructional design team was simply handed sixteen existing videotapes to be used as a starting point to create the online course modules.

With the videotapes in hand, it was necessary to go back to the drawing board numerous times to determine how to integrate the various multimedia components (text, audio, video, computer screen shots) to create a quality interactive online learning experience. The students taking the on-campus version of the course were able to follow along on their laptop computers as the instructor demonstrated the software using a projected computer screen. The instructor provided instructions regarding specific tasks to complete using the software, and the students in the classroom then worked on the assignment on their laptops. It was clear that there would have to be a similar process by which online students could have the software applications and

related sample files open while following the instructions for each task. The instructional design team could not simply put the entire videotape online for reasons discussed earlier (such as bandwidth and pedagogy issues), so the decision was made to design the instruction for the distance students so they could either read the content as text on-screen or listen to the audio of the course as it occurred in real-time in the classroom, with the video edited to serve only to introduce modules, provide transitions, and present summaries for module closures.

In shooting the video in the classroom, two cameras were used to record the essential information. The first recorded a head-and-shoulders image of the instructor and included her voice. This tape was eventually used for the audio track as well as capturing the video for the online course module introductions, transitions, and summaries. The second camera picked up the computer screen throughout the entire lesson. These tapes captured what the instructor was doing in each module to later recreate legible screen shots for the online audience.

Since the software examples projected on the screen in the actual classroom would not be visible in a tiny window on a computer monitor, distance students would not be able to view the screen shots from the existing videotape while simultaneously working with the software. It was determined there were two possible ways for students taking the course online to participate. First, the students could listen to the audio only, in the background, while they worked through the task instructions. The second option was to provide written transcripts of the instruction and include screen shots of the steps where the students could either toggle between the text and the screen shots, or print out the information and follow along with the module lesson. This second option would lose much of the dynamic interaction between the instructor and the on-campus students in the classroom, but by providing two options the distance learners could chose the method that would best suit their own learning styles: reading text or listening to audio.

Although time consuming, there were compelling reasons to transcribe the audio, one being to meet the Americans with Disabilities Act (ADA) requirements for accessibility. Another rationale for transcribing the content, however, is that evaluation data and anecdotal evidence have shown that students will listen to the audio section of video instruction the first time they review it, and will then use the text notes or transcripts to study from and to take additional notes.

Two of the authors of this paper reviewed the videotapes of the course to identify video segments that could be used for module introductions, transitions, and closures. Using video in this way not only gives the students a sense of who the instructor is, but addresses the importance of immediacy in distance learning. This often functions as an ice-breaker for both the instructor and the student. The extensive use of video should never be included in online courses, to try and avoid the "talking head" or "record the lecture live and send it out" traps of distance learning. Research has shown that simply videotaping faculty lectures and playing them back to students are not an effective method of delivering instruction (Gibbons, Kincheloe, & Down, 1984; Sensiper, 2000).

Working with the course videotapes, the student staff member viewed both videos (the instructor's image and the computer screen shots) simultaneously and identified the computer

screen shots needed for the online course. An average of 150 screen captures per module were created using screen capture software. The video segments that were not essential to the course content were identified and deleted in the editing process. The audio was also edited to remove extraneous comments. Once the tapes were edited, the audio track was dubbed for transcribing.

The course designer, using the learning management system, assembled a prototype of one module which included the edited text transcripts, the screen shots placed in the transcripts, links to the audio, and the video clips. The instructions for one module were long enough to require four individual web pages linked together. The instructional design team reviewed the prototype with the instructor who approved the sample module. Development then continued in the same fashion for the remaining course modules.

Discussion and Recommendations

In this case, the instructional design process was reversed. Given a set of existing videotapes of the course, the instructional design team was forced to work backwards. Instead of meeting with the instructor to assess and analyze the goals and objectives of the course, and then determining the most appropriate mix of media to deliver the course online, the design team had to deconstruct an already finished product. They had to identify and pull out multimedia elements (audio, video, computer screen shots) from the videotapes of the course, and retrofit them into modules within a learning management system. This method of intensive post-production is very costly in both time and money, and as with any grant-funded project, the instructional design team was working under time and resource constraints. Additionally, the production quality of the elements contained in the online course was compromised by merely editing together pieces of existing audio and video. Audio recorded in a sound booth, and video shot in a professional studio, would have a much higher production value than the audio and video that was recorded in an ill-equipped classroom by an inexperienced technician.

However, there can be some positive advantages to developing an online course using this method. The primary benefit is the ease of updating information in the future. The text and screen shots can easily be updated when revisions are made in the software covered in the course (in this case, the Microsoft Office Suite). The entire course would not need to be re-taped; just the short video clips that start and end each module along with transition elements would be updated. The video clip overviews should be just that, and not be affected by changing versions of the software. The downside to this method, beyond the high initial cost of development, is the large volume of text required to explain software processes that would lend themselves better to full-motion media such as video. The design of this particular online course requires the student to do a great deal of reading and/or listening to follow the flow of instruction because of the highly interactive nature of the course.

How could this situation have been resolved in a more cost-effective, time-efficient fashion? Based on their experience developing this Web-based course, the authors recommend that known instructional design methods be used when creating similar online skills courses.

One approach would be to have the instructor videotape the course in a studio without live students. This will make the information recorded more succinct and directed specifically to the distance learner. Videotaping live courses short-changes not only the distance learner, but also the students in the class being videotaped. In the on-campus classroom they are not able to interact with the instructor as freely since they are typically requested to hold all questions or comments until the videotaping session has ended. The instructor is torn between the students in the classroom and addressing the needs of the distance learners, and neither group is well served. One additional benefit is that a typical studio module could be approximately 2/3 the length of the same class with live, face-to-face instruction. This would also reduce the time it takes to transcribe and edit the content transcripts, as well as greatly improve the quality of the audio and video.

Additionally, the instructor (not an instructional design team member) could create the screen shots, images, and examples used in the online course modules. Using instructor-designed graphics would greatly reduce the amount of time required for a non-content expert to create these images based on what the instructor says on tape. This would also free up the time and resources for the course developer to use Flash or other animation software to create dynamic examples instead of static screen shots.

One area for future investigation is to study the insertion of high-resolution screen shots "on-the-fly" into the instructor's video as the hands-on portion of a lesson is demonstrated live. This would be best accomplished in a well-equipped classroom or studio with two or three representative students (for task completion timing purposes) so that retakes could be possible if an error occurred. The completed video and other media elements would then be distributed to enrolled students in a series of DVDs as part of the course "textbook." The course PowerPoint lecture notes and test elements would be optimally delivered online within the learning management system, as is typical in other online courses.

Delivering the instructional content using DVDs in this particular project was not an option for two reasons. First, the funding agency was adamant that the course be available entirely online, which excluded the use of any external media. The second reason was dictated by university policy. In an attempt to make online courses available and accessible to the widest possible student base, the university defined minimum computer hardware and software standards for all distance education students. Faculty teaching online courses are expected to observe these requirements and to publish these standards as part of their course syllabi. The requirements identified by the university were very minimal, particularly given modern technology standards.

An additional key point was that the university did not require either a CD or DVD drive in computers used by distance students. By having an internal DVD player or a separate DVD display set up next to a computer for playing the video segments of the module would simplify the fragmentation of the computer screen, as just two elements (the online content and the software application itself) would be running together at the same time, rather than three separate elements all combined into one learning management system module. This omission will certainly be addressed in the near future as more basic computer systems are sold that include a DVD drive, but in this case study it meant that the course designers could not consider

sending video content to online students on DVDs as a potential solution for the delivery of previously videotaped instruction.

Research has shown that using video is the most appropriate and effective method to demonstrate simulations (Christel, 1994), hands-on tasks (Shepard, 2003), and other wide-ranging types of information (Wetzel, Radtke, & Stern, 1994). Video was indeed an appropriate method to deliver some content in this particular Web-based skills course, beyond only short introductions and transitions, such as the instructor's demonstrations of the software. The use of video instead of screen shots in this instance would have improved the online course and lessened the amount of reading and/or listening currently necessary for the distance learners to receive the information.

Other instructional design options may be considered as well. One is to use an existing software tutorial/workshop package for the actual step-by-step instructions on how to use the software. Many vendors provide such instructional content on CD-ROMs or DVDs for most commonly used software applications. Utilizing this model, the instructional design team could then help the instructor focus on the key question: "What unique content needs to come from me?" For example, the instructor could create additional content that describes how the software application can be applied in specific disciplines or situations.

Eventually, the nationwide diffusion of high-speed broadband Internet access and the spread of Internet2-level connectivity will facilitate the online delivery of high-definition instructional video in a hands-on software skills course. However, this technology may take decades to successfully diffuse into isolated rural areas of the United States. Until that time, online course designers will need to use all the creative tools at their disposal to deliver effective video and high-resolution digital content to learners at a distance.

Conclusion

In this case study, instead of the instructional design team working with the course instructor from the beginning and applying instructional design theory, circumstances dictated by the culture of the university forced the instructional design team to work backwards by taking existing material and developing it for delivery in a computer-based Internet course by repurposing videotape. Video elements were used in three different ways: to introduce each module, for transitions between segments, and to conclude each module. The course content was delivered in sixteen modules that also included instructions using other media such as text, audio segments, and embedded computer screen shots to illustrate the steps in the task being taught.

This case study describes the process the instructional design team utilized to successfully convert existing videotapes into online course modules. The authors have illustrated a way to succeed even when approaching the instructional design process in reverse. The course of action developed was neither inexpensive, smooth, nor easy in execution, but it did yield a very marketable online course that incorporates a variety of media to enhance student learning at a distance.

References

Bates, A. (1995). *Technology, open learning, and distance education.* London: Routledge.

Berge, Z.L. (1998). Guiding principles in web-based instructional design. *Educational Media International, 35*(2), 72-76.

Bruning, R., Horn, C.A., & PytlikZillig, L.M. (2003). *Web-based learning: What do we know? Where do we go?* Greenwich, Connecticut: Information Age Publishing.

Carnevale, D. (2005, June 28). Online courses continue to grow dramatically, enrolling nearly 1 million, report says. *The Chronicle of Higher Education.* Retrieved June 28, 2005 from http://chronicle.com/prm/daily/2005/06/2005062802t.htm

Clark, R.E. (1994). Media will never influence learning. *Educational Technology Research and Development, 42*(2), 21-29.

Christel, M.G. (1994). The role of visual fidelity in computer-based instruction. *Human-Computer Interaction, 9,* 183-223.

Christensen, D.L., Dunnagan, T., & Tennyson, R.D. (1998). The future of instructional theory: Lessons learned. *Journal of Structured Learning and Intelligent Systems, 13*(2), 103-113.

Dick, W.O., Carey, L., & Carey, J.O. (2005). *The systematic design of instruction.* Boston: Allyn & Bacon.

Finkelstein, M.J., Frances, C., Jewett, F.I., & Scholz, B.W. (2000). *Dollars, distance, and online education: The new economics of college teaching and learning.* Phoenix, AZ: The Oryx Press.

Foshay, W.R. (2001). Can instructional design deliver on the promise of the web? *The Quarterly Review of Distance Education, 2*(1), 19-34.

Gibbons, J.F., Kincheloe, W.R., & Down, K.S. (1984). Tutored videotape instruction: A new use of electronics media in education. In O. Zuber-Skerritt (Ed.), *Video in higher education* (pp. 205-220). London: Kogan Page.

Gillespie, F. (1998). Instructional design for the new technologies. *New Directions for Teaching and Learning, 76,* 39-52.

Gustafson, K.L., & Branch, R.M. (1997). *Survey of instructional development models.* Syracuse, NY: ERIC Clearinghouse on Information and Technology.

Hedberg, J., & Sims, R. (2001). Speculations on design team interactions. *Journal of Interactive Learning Research, 12*(2/3), 193-208.

Keppell, M. (2001). Optimizing instruction designer-subject matter expert communication in the design and development of multimedia projects. *Journal of Interactive Learning Research, 12*(2/3), 209-227.

Leshin, C.B., Pollock, J., & Reigeluth, C.M. (1992). *Instructional design strategies and tactics.* Englewood Cliffs, NJ: Educational Technology Publications.

Mayer, R.E. (2003). The promise of multimedia learning: Using the same instructional design methods across different media. *Learning and Instruction, 13,* 125-139.

Mehlenbacher, B. (2002). Assessing the usability of on-line instructional materials. *New Directions in Teaching and Learning, 91*, 91-98.

Mellon, C.A. (2000). Technology and the great pendulum of education. *Journal of Research on Computing in Education, 32*(1), 28-35.

Morrison, G.R., Ross, S.M., & Kemp, J.E. (2001). *Designing effective instruction.* New York: John Wiley & Sons, Inc.

Pan, C.C., Deets, J., Phillips, W., & Cornell, R. (2003). Pulling tigers' teeth without getting bitten: Instructional designers and faculty. *The Quarterly Review of Distance Education, 4*(3), 289-302.

Sensiper, S. (2000). Making the case online: Harvard Business School multimedia. *Information, Communication, & Society, 3*(4), 616-621.

Shephard, K. (2003). Questioning, promoting and evaluating the use of streaming video to support student learning. *British Journal of Educational Technology, 34*(3), 295-308.

Somekh, B. (2001). The role of evaluation in ensuring excellence in communications and information technology initiatives. *Education, Communication & Information, 1*(1), 75-101.

Stake, R. (1995). *The art of case study research.* Thousand Oaks, CA: Sage.

Webster, J., & Hackley, P. (1997). Teaching effectiveness in technology-mediated distance learning. *The Academy of Management Journal, 40*(6), 1282-1309.

Wetzel, C.D., Radtke, P.H., & Stern, H.W. (1994). *Instructional effectiveness of video media.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Wiens, G., & Gunter, G.A. (2002). Delivering effective instruction via the web. *Education Media International, 35*(2), 95-99.

Yin, R. (1989). *Case study research.* Thousand Oaks, CA: Sage.

Zafeiriou, G., Nunes, J.M.B., & Ford, N. (2001). Using students' perceptions of participation in collaborative learning activities in the design of online learning environments. *Education for Information, 19,* 83-106.