Chapter 4.10
Creating and Using Multiple Media in an Online Course

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ABSTRACT

The adaptation of a traditional, face-to-face course to an online format presents both challenges and opportunities. A face-to-face fundamentals course treating the science of musical sound and the methods used to code and transform musical sound using digital computers was adapted for online delivery. The history of the course and the composition of its audience are discussed, as are the decisions to create movies, Web pages, electronic mail, and a paper textbook for the course. Practical choices for technology, which reflect the conflicting benefits of choosing simple versus more sophisticated technology, are outlined and the reactions of the students to these choices are discussed. An anecdotal comparison between an online and a face-to-face course section is offered, along with ideas for future development.

BACKGROUND

Computers in Musical Applications is a course that has been offered in the Esther Boyer College of Music for 16 years and serves as a prerequisite for three music technology courses. The course was designed to provide students who expressed an interest in electronic and computer music with a detailed knowledge of the principles of acoustics and computer engineering that define the processes of digital recording, editing and synthesis of sound, and, to a more limited extent, digital video. When the university faculty adopted a core curriculum in 1986 that required a two-course sequence in science and technology, *Computers in Musical Applications* was proposed to serve as a second-semester core science course. The course would follow an acoustics class that was offered by the Physics Department and required of all music students. Since 1986, it has been offered each year with section enrollments ranging from 10 to 60 students.

Initially the course was taught in a traditional, face-to-face format that included a weekly, two-

hour lecture class and a one-hour laboratory section comprised of small groups of students taught by a graduate student. The textbook for the course (Dodge & Jerse, 1985) was the same one used in a subsequent software synthesis class. The transition in 1986 from a small, self-selected class of technology enthusiasts to a large group of students with varied interests was challenging and was made more so by external factors such as the absence of a large lecture room with desks, difficulty in recruiting lab instructors with the necessary background and teaching skills, students' lapses in retained knowledge from the acoustics class, and complaints about the purchase of an expensive textbook of which only a few chapters were used. Another challenge was offered by the academic schedule of music students. Music ensembles such as orchestra carry only a one semester-hour credit but meet at least three hours per week with additional rehearsals and performances according to the college performance schedule. Faculty are expected to routinely excuse students from academic classes several times in a semester to participate in rehearsals and performances, and graduating seniors miss additional classes during the week of their senior recitals. As a result, class attendance is less than consistent. Also, the instructor is asked to provide considerable time outside of class teaching missed material. Finally, many music students are foreign students for whom English is a second language, and who struggle with comprehension in lecture classes. An opportunity arose to revise the course to address these challenges when *Computers in Musical Applications* was offered as an online course.

COURSE DESIGN

Students in the online course used a textbook, a CD-ROM, course Web pages, and e-mail. The online course was designed for asynchronous delivery and could accommodate any student's schedule; however, examinations had to be taken on campus unless special arrangements were made in advance of the examination date. Face-to-face group orientation sessions were added to the online class in later years to help students start the course, although all orientation materials were available online. The textbook's 10 chapters correspond to 10 major lecture topics for the course and contain all the basic material from which examination questions are composed (see Appendix A).

There is a midterm and a final examination with 50 to 60 multiple choice questions, most requiring calculation. Easy questions test one fact or formula in a form that is familiar to students from their class materials, but more difficult questions combine several facts and formulas in problems that also contain unfamiliar data.

The CD-ROM contained 10 condensed lectures in the form of QuickTime movies, each about 10 minutes long. Also included was a freeware application and 33 sound examples used for lab experiments, which gave students ample opportunity to experiment with digital manipulation of sound. The creation of the CD-ROM and course Website will be discussed later in this chapter.

The face-to-face laboratory sections were replaced by 10 laboratory experiments designed to use Dale Veeneman's SoundHandle software.[1] Students can use SoundHandle to view waveforms and edit short sounds, create sounds using various waveforms and noise, and compute and view the frequency spectrum of sounds using the Fast Fourier Transform[2] (Veeneman, 1995). The lab experiments involve the measurement and perception of sound, the confirmation of Nyquist's limit,[3] and the source of and quality of digital noise. Students e-mail their lab reports to the instructor for grading and comment. There are opportunities within these experiments for qualitative discussion via return e-mail, which also allow the instructor to develop some rapport with the students (see Appendix B).

The course Website serves as the portal to the class, presenting the syllabus, the orientation