Application of Multimedia Technologies to Enhance Distance Learning

WENDY BUCKLEY and ALEXANDRA SMITH

ABSTRACT: Educators' use of multimedia enhances the online learning experience by presenting content in a combination of audio, video, graphics, and text in various formats to address a range of student learning styles. Many personnel preparation programs in visual impairments have turned to online education to serve students over a larger geographic area. The authors describe how the use of multimedia evolved within an online master's degree program in visual impairments.

KEYWORDS: distance learning, multimedia technologies, personnel preparation in visual impairments

Distance education is a brave new world: dynamic, engaging, evolving, and growing. Individuals can study from virtually anywhere without having to physically relocate to attend a college or university. The field of visual impairments has been coping with a critical shortage of teachers, funding, and training for several decades (Mason, Davidson, & McNerney, 2000). Distance education can address the shortage of teachers by allowing individuals to remain at home while receiving training, thereby increasing the likelihood that they will continue to reside in areas where the need for trained teachers of students with visual impairments may be the greatest (Day & Sebastian, 2002).

Distance education has evolved from the correspondence course of the past to an interactive virtual classroom where teacher and student roles are being redefined (Ferrell, 2000). The instructor no longer stands in front of the class lecturing but is now the designer of a learning environment. The

student's role has changed from that of a passive learner sitting in the classroom to that of an active seeker of information. The emphasis has shifted from the teacher teaching to the student learning.

We began teaching Braille in a traditional, face-to-face classroom environment in 1994, with no technology supports. Gradually, with the introduction of projectors, Microsoft PowerPoint, videotapes, and software to demonstrate Braille, the computer became an integral part of the class as a presentation tool. Use of technology in the classroom captivated students' interest and created the impetus for employing technology to support learning and teaching.

In the spring of 2003, the primary means of conveying information in distance education courses were e-mail, bulletin boards, satellite broadcasts, the telephone, and the traditional postal system (Day & Sebastian, 2002). At that time, the Northeast Regional Center for Vision Education at the University of Massachusetts (UMass) Boston piloted its first fully online Braille course. One student commented in an e-mail communication to the instructors, "I don't think I'm cut out for an online course. There's so much reading. . . I think I would do better if I could just hear your voice instructing us" (W. Buckley, personal communication, April 2003). That message was among the motivating factors that launched our exploration of how we could use multimedia over the Internet to meet the diverse learning styles of students.

Definition of Multimedia

Vaughan (2003) defined *multimedia* as presenting information through multiple processes including but not limited to text, audio, graphics, animation, and video. Instructors can integrate multimedia content into course materials that students can access online, or they can transfer the material to CDs or DVDs that students can view off-line. When an instructor uses multimedia, content delivery often is more efficient and dynamic. The materials must be in a format that can engage students, maintain their interest, and meet their learning needs. Students can control when and how often they access content (Bruce & Hwang, 2001). Presenting course materials through multimedia engages students in ways that are not possible with a textbook alone. In a typical face-to-face course, the instructor presents material to the students orally, with or without visual supports (e.g., PowerPoint presentations, videos) and must sustain the attention of the audience for the duration of the class period. In an online course in which students can access the

learning material at any time and from a variety of settings, the instructor is not physically present to gauge the students' attention. Instructors do not use multimedia in isolation but to enhance content already presented to students in a traditional format, through textbooks or Web pages.

Method

As we moved from teaching face-to-face to online, our initial challenge was to convert classroom activities into an online format. We found that multimedia facilitated the process. The following list illustrates part of the range of tools available for creating multimedia. It is not all-inclusive but represents some of the primary tools that we have used to incorporate multimedia content into the courses at UMass Boston.

- Digital photographs
- Microsoft PowerPoint presentations
- Macromedia Breeze Presenter by Adobe
- Quicktime, RealOne, or Windows Media for streaming content
- TechSmith Camtasia Studio
- Adobe Flash
- Screen-capture software
- Synchronous online conferencing

In this article, we describe the course materials that we created with these tools and demonstrated live at the 2006 Association for Education and Rehabilitation of the Blind and Visually Impaired (AER) International Conference.

Digital Photographs

In Figure 1, a static HTML Web page uses digital photographs to illustrate content. The lesson focus for this Web page is setting margins on a brailler. Written instructions outline the steps that a student must follow to change the margins on the brailler. Digital photographs with close-up images of the brailler and margin release tabs accompany each written step. The text conveys all of the information that is necessary to complete the process. However, the images enhance the text for the student and provide support for visual learners. We tag each image with an alternative text that describes the picture for users accessing the Web page with a screen reader. It is essential that all images on Web pages have alternate tags associated with them for accessibility.

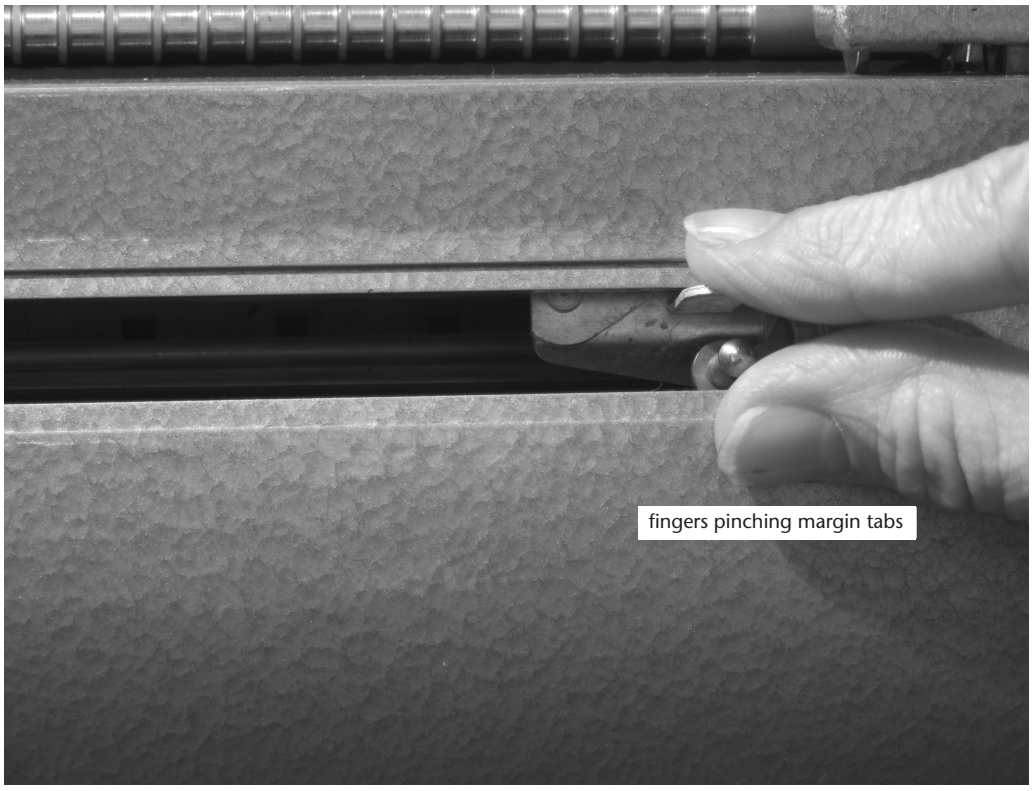


FIGURE 1. Slide demonstrating how to set the margins of a brailler.

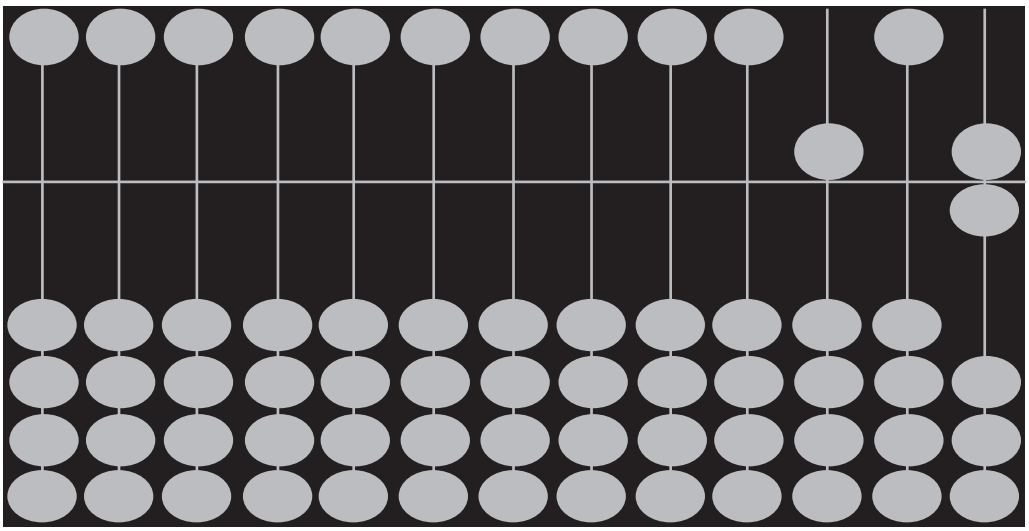
Presentation Software

Microsoft PowerPoint is commonly used in the classrooms for a sequential presentation of information. Figure 2 is part of a PowerPoint presentation that walks students through setting and reading numbers on an abacus. Alternative text associated with each image of the abacus states the position of the beads. *Next* and *back* action buttons added to each slide allow the student to navigate through the presentation. Students can save the slides as Web pages using PowerPoint's built-in *save as* feature. The sequential aspect of using slides allows the student to step forward or backward through the information at a comfortable pace, viewing one slide at a time. Using HTML format leaves the text and navigation links accessible to individuals who use screen readers.

Presentation Software Add-Ons

Macromedia Breeze Presenter by Adobe is a PowerPoint plug-in that converts the presentation into Flash media. Breeze presentations can be run from

Column three: the upper bead is set.
Column two: clear.
Column one: 1 lower bead and the upper bead are set.



Back Next

FIGURE 2. Slide depicting a virtual abacus.

a server over the Internet, saved to a computer hard drive, or transferred to a CD. UMass maintains the software license and provides online instructors with the Breeze plug-in and server storage space. Features of Breeze Presenter include the ability to add and synchronize audio narration, insert video clips, and add quiz functions to PowerPoint files. The presentation is published in a player format with viewer controls, including ones that permit quick navigation to a specific slide and the ability to play, pause, and rewind the audio on any slide. The user can automatically set the presentation to play through to the end and does not need to install any additional software to view it. Keyboard navigation controls are accessible for screen readers to advance and review each slide manually.

An example of using Breeze is an "Orientation to the Brailler" PowerPoint that we created for the Braille I course. Each slide includes digital photographs and descriptive text to point out key components of the brailler. Using Breeze Presenter makes it possible to add to the slides audio descriptions that convey the content displayed by the images. Slide notes added when we created the PowerPoint presentation provide text support for the audio: The user can view the notes at any time. Because images

and text are not accessible to screen readers in Flash, it is essential that the audio provides all the information conveyed by the images and text on the slides.

Using audio alone can convey information without the distraction of a visual image. By using Breeze, we can create a presentation containing only one slide and the entire audio instruction for a self-directed activity. We use this technique in the course when we send students an embossed Braille page to experience and learn about tracking lines of Braille. The single slide containing the words "audio file" remains on the screen while the audio narration guides the student through the activity. The slide has no bearing on the content but reminds the visual learner that the Breeze presentation contains no visual material. We present this audio activity to students after we have introduced them to the Mangold Developmental Program of Tactile Perception and Braille Letter Recognition through an online lecture. The Breeze presentation provides hands-on practice with similar materials, giving the students the opportunity to experience this resource from the perspectives of both teacher and learner. Multimedia presentations such as this provide an introduction to teaching materials that students will later experience firsthand through their supervised classroom practicum.

In a hands-on lesson with the abacus, students follow along with the Breeze presentation as they learn to perform calculations. The audio portion of the presentation contains all the instruction and is accompanied by a visual animation achieved through multiple screen shots of a virtual abacus similar to that shown in Figure 2. The use of audio and visual animation helps to tap the different learning styles of the students in the course. We post the audio as a text document for students to print or emboss and save for reference.

We also use Breeze Presenter to engage students by presenting a lesson with companion "try it yourself" materials (see Figure 3). In the instructions, we ask students to view lesson slides and stop the presentation at designated intervals to complete examples on their own. We prompt the student to continue the presentation on completion of the problem. Once the student activates the play function through a mouse click or key press, the presentation resumes, and the student can follow the discussion and explanation of the answers. This method of using interactive exercises embedded in lesson content keeps the student connected with the material as it is presented.

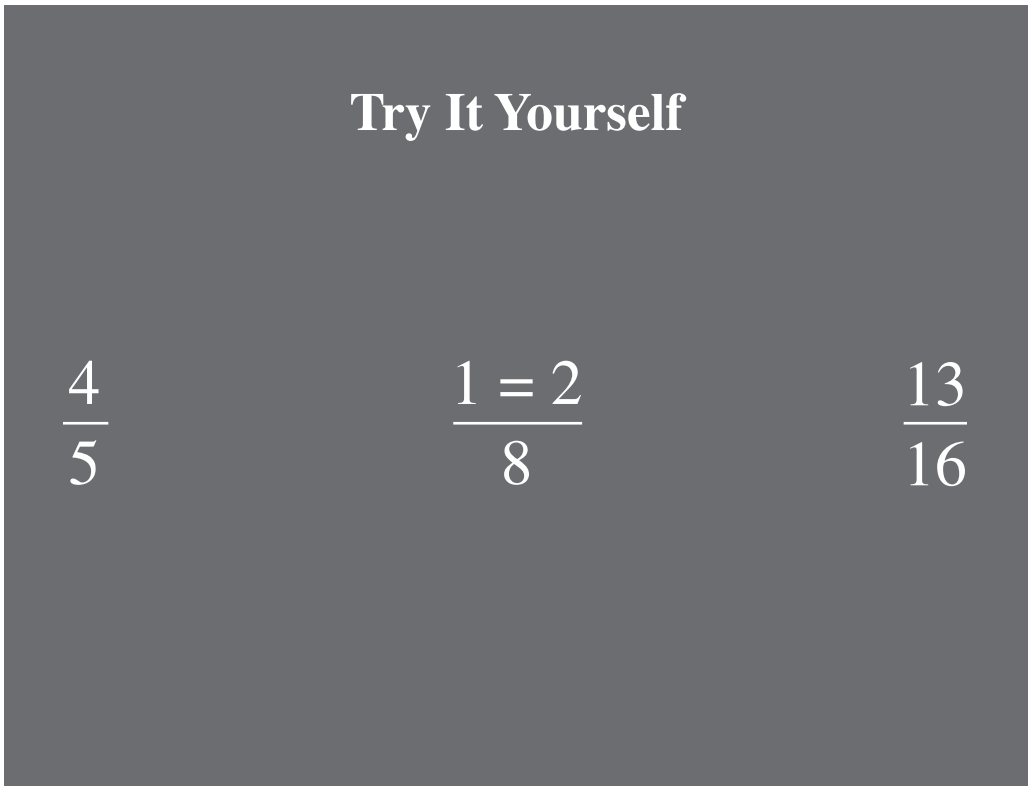


FIGURE 3. Slide of "Try It Yourself" material.

Video: Streaming and Progressive

Video is an effective tool to enhance content in the classroom (Bruce & Hwang, 2001). In the early stages of teaching online, we created videos from sequential still images with added narration and converted videos into streaming Real Media. Problems that students encountered in accessing these videos online included choppy or grainy videos, freezes, and lengthy delays, particularly with dial-up connections. Because these videos were housed on a streaming server, it was difficult for us to spontaneously update or edit their content. A current method of producing video for online presentation known as progressive video, which uses a separate progressive viewer to display Flash video, eliminates these problems. We use TechSmith Camtasia Studio to edit and produce the Flash video and use Macromedia Dreamweaver 8 to produce the progressive viewer. Progressive video can be embedded into an HTML Web page and housed on any Web site. Camtasia Studio is a video editor and multiformat producer that can also record activity on the computer

screen for use in presentations for teaching or training. Dreamweaver 8 is an HTML editor.

Web Conference Tools

Synchronous online conferencing provides a format for live online meetings of any number of people. As of this writing, UMass Boston currently uses Talking Communities tcConference and Horizon Wimba Live Classroom. Live group communication and interaction are the primary benefits of synchronous online conferencing. Individuals participate in the sessions by using computer headset microphones. Some features of the synchronous online conferencing tools are audio and text chat, the ability to show and interact live with a PowerPoint presentation on a white board, *application sharing*, which allows the instructor to give the group live demonstrations of software, and *Web safaris*, which make Web pages visible to the group as the presenter browses through them. Students can speak with the teacher to get help with content and meet with other students to work on group projects. Time zones are a consideration, but those who cannot attend the meetings can record them for later review. Students report that by enabling them as a group to connect with each other and the instructor, this tool alleviates some of the isolation that they feel in distance education courses. Individuals who use screen readers can operate both tcConference and Horizon Wimba through keyboard commands.

Student Response to Multimedia

Student feedback is a major source for evaluating the effectiveness of multimedia in online courses. In a reflection paper required at the end of the Braille II course, one student wrote:

> I was baffled as to how four people living in three different states could possibly complete a project this elaborate and prepare a presentation without the opportunity to consistently meet with each other in person. . . .
>
> With so many ways to communicate and get together on WebCT, it was effortless to schedule meetings and have discussions about the project. I honestly don't think we would have made half as much progress working together as a group had we not had those many outlets for sharing information. (Connell, 2007)

Instructors can incorporate multiple technologies into their course design. The positive experiences of the students will ultimately determine which ones are most effective in enhancing delivery of the course.

Conclusion

Distance education presents many challenges to students and instructors. Instructors must adjust to a changing role in a classroom transformed from the physical to the virtual. Although instructors can no longer rely on traditional methods of instruction to engage and sustain students' attention, the isolation that students feel in the virtual classroom is real and can affect their learning negatively. Multimedia, in conjunction with traditional teaching materials, enhances the educational experience for online students by offering a variety of ways in which to learn and interact with content.

REFERENCES

Bruce, S. M., & Hwang, T. T. (2001). Web-based teacher preparation in visual impairment: Course development, teaching, learning, and quality assurance. *Journal of Visual Impairment & Blindness, 95*. Retrieved February 27, 2007, from http://www.afb.org/jvib/JVIB951003.asp

Connell, J. (2007). *Braille II reflections*. Unpublished manuscript.

Day, J. N., & Sebastian, J. P. (2002). Preparing vision specialists at a distance: A qualitative study on computer-enhanced learning. *Journal of Visual Impairment & Blindness, 96*. Retrieved March 3, 2007, from http://www.afb.org/jvib/jvib961104.asp

Ferrell, K. A. (2000). Technology as an aid for personnel preparation. In C. Stuen, A. Aditi, A. Horowitz, M. A. Lang, B. Rosenthal, & K. R. Seidman (Eds.), *Vision rehabilitation: Assessment, intervention and outcomes* (pp. 809–811). Lisse, The Netherlands: Swets & Zeitlinger.

Mason, C., Davidson, R., & McNerney, C. (2000). *National plan for training personnel to serve children with blindness and low vision*. Reston, VA: Council for Exceptional Children.

Vaughan, T. (2003). *Multimedia: Making it work* (6th ed.). Berkeley, CA: Osborne McGraw-Hill.