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## The E-Learning Balancing Act: Training and Education with Multimedia

Whether developing an entire distance learning program or augmenting a more traditional educational platform, e-learning professionals today are experimenting with various combinations of Web- and multimedia-enhanced materials. Network, system, and bandwidth limitations (as well as budget considerations) frequently prohibit e-learning programs from launching full-fledged multimedia courses. Developers must weigh the needs and expectations of their learners and identify the multimedia features that most effectively help them achieve their objectives.

E-learning endeavors aim to enable and elicit learner interaction. When the Web-based training and distance learning industry speaks of interaction, it can mean hyperlinked text, 3D animations, “smart” applications that adapt to user activities, or live instructor-led courses. However, in a world where students (whether corporate trainees or high schoolers) are beginning to want highly interactive material when and where they need it, e-learning programs are facing an ever more complex task of balancing the appeal of multimedia content with limited resources.

Like televised video before them, the Web and multimedia content have the potential of changing the face of education. But no company or school has yet to find the holy grail of distance education. Corporate training groups and traditional educational institutions are trying out a myriad of different combinations of e-learning scenarios, from email or Web-based instant messaging to fully interactive CD-ROMs. Whether these e-learning programs are online or offline often dictates the extent to which they offer multimedia-rich content.

### Weighing your options

One of the earliest implementations of multi-

media in distance education was televised courses, or telecourses. The *Chronicle of Higher Education* reported that more people across the US today take telecourses—either via interactive video networks, videocassettes, or broadcast television—than courses over the Internet (“Telecourses Change Channels,” 13 July 2001). Web course participation is increasing more rapidly, but telecourse enrollment still outnumbers that of online courses.

An obvious drawback of pretaped videos is the lack of active participation. Yet an advantage is that students can view the materials when and where they want. The Public Broadcasting Service’s Adult Learning Service, which began offering telecourses in 1980, reported in the *Chronicle* article that many of its students record local telecourse broadcasts and view them later.

Live telecourses have just the opposite advantages and drawbacks. Although students might enjoy interactions with instructors and students via audio connections, they most likely must attend courses at specific locations, such as satellite university campuses, and at fixed times. To address these issues, some programs are migrating toward a combination of TV and Web delivery systems, or *teleweb* courses, that include supplemental online material and chat rooms.

This combined format is often a cost-effective solution for distance learning providers. MetLife Financial Services (MLFS) faced similar issues when it decided to develop an online learning system to train its geographically dispersed workforce in fall 1999. MLFS representatives need to learn about product information and procedural changes quickly and prepare for mandated exams. The representatives previously traveled to a central corporate office for intensive face-to-face training. The company realized Web-based training would never entirely replace in-person classes, but it could reinforce them while reducing travel expenses.

To develop their system, MFLS partnered with HorizonLive—a New York-based company that provides online interactive group learning and collaboration Internet solutions—because its products don't require plug-ins or downloads. After one full year of production, MetLife implemented an instructor-led, real-time virtual classroom that it delivers over its intranet. The live interaction includes one-way audio from the instructor to the participants, a two-way text chat and response system, and a whiteboard area. One of the main system concerns for MLFS was low bandwidth in its field office. The combined audio and text system best fit its network capabilities while ensuring live communication between trainers and trainees. MLFS also archives the live courses to provide its representatives on-demand viewing and reference.

In 2000, its first full year of operation, MLFS delivered 45 classes to 1,300 participants, and an equal number used its archives.

### **Tipping the scale**

While MetLife and many telecourse distributors are primarily interested in live learner participation, other organizations might have different priorities that could dictate another mix of multimedia features. The National Human Genome Research Institute (NHGRI) was more interested in broadly distributing offline educational material, so it was able to develop a CD-ROM with rich video and animations that bandwidth-restricted providers must avoid. IDI Multimedia created the interactive CD-ROM, *The Human Genome Project: Exploring our Molecular Selves*, for NHGRI on the Human Genome Project (see <http://www.nhgri.nih.gov/educationkit>). The partners in the Human Genome Project are distributing the CD-ROM (along with the video documentary *The Secrets of Our Lives* and an information brochure) to help the public understand how genomics will improve health and affect lives. After nine months of production, they released the multimedia kit in spring 2001.

The CD-ROM includes 3D animations illustrating the basic components and principles of molecular biology; an interactive time line of genetics with more than 90 key events in the history of genetics occurring over nearly 150 years; and a glossary of genetics terms with written definitions, related terms, illustrations, phonetic spellings, and audio clips of scientists defining the terms.

In collaboration with Henninger Media Services and the National Human Genome Research

Institute, IDI Multimedia created a dynamic graphical user interface and navigation system. Geared toward high school students, the multimedia kit incorporates a game-like user interface to guide users through the CD-ROM content. IDI Multimedia's President John Grzejka explained, "It was critical for us to develop a format that would engage our target student users."

NHGRI actually ran out of CD-ROM kits in a few months. To provide continued broad access to the kit, the project team is reformatting it for viewing on the NHGRI Web site. They expect reformatted material to be available sometime in fall 2001. (Visit <http://www.nhgri.nih.gov/educationkit> for up-to-date information.)

### **Finding a balance**

In a project that incorporates many of the e-learning features we've seen so far, the University of Michigan's Department of Surgery is developing a three-part Web-based training program that delivers education on and about surgeries. The surgery department believes it's important to provide information for both medical students and patients. One of the foremost concerns explained Steve Haskin, Associate Director of Internet and Intramatics Development in the Department of Surgery, is delivering training and information to medical students, residents, and patients when they need it.

The medical student training includes taped lectures for review. Haskin's team tapes traditional lectures and then incorporates the professor's slides at the production stage by converting video to JPEG images. Audio is the most important component of the taped lectures, so they reduce the lecturer's image to a 90- to 100-pixel-wide talking head. The system shifts to slides when appropriate, enabling low bandwidth and resolution.

In addition, the Department of Surgery has amassed a library of 350 surgical procedures on high-bandwidth, high-resolution video. Residents and third-year medical students can access the material on the Web at a portal facility at the school. Two Gigahertz Ethernet rings enable Haskin's team to stream the prerecorded video.

In providing these services, the emphasis was on having the medical training material available when its needed. Medical residents can review a procedure before going into surgery to reinforce their existing education. Residents in particular need timely training for surgical procedures that are new to them before entering the operating room.

The last component of the Department of

Surgery's services is a patient education program. For patients diagnosed with a condition awaiting surgery, the department supplies written information as well as videos and animations of medical procedures. The patients must visit the Michigan facilities and log on at designated kiosks to access the materials. The law actually requires that patients receive some sort of education about their surgery, recovery, resulting lifestyle changes and so on, and experience has shown that patients respond better and recover faster when they're

educated about their procedures and armed with knowledge of what to expect.

For Haskin, successful content delivery is the most important function of the Internet. For each of the programs we've seen here, determining how and when their learners need that content was the first step in evaluating multimedia options. For schools or corporations offering distance learning programs, delivering courses is about balancing investment costs and network limitation with desirable multimedia features. **MM**

## Curing with Computers: Multimedia in the Medical Field

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**S**oon multimedia will affect the way we see, think, and interact with the medical world. While some fear that the Internet's developmental avenues are temporarily halting, others point to the innovations and changes within the medical field regarding multimedia technology. Regardless of the economy, people will always need a doctor. Since hospitals want to maximize the use of their staff, both in efficiency of the staff's time and performance, research and development concerning computers and their use in the medical field remain viable. Innovations to meet patients' and health-care professionals' needs are emerging through multiple computer mediums, including Web cams, personal digital assistants (PDAs), and intelligent robots.

### Take two aspirin and see you on the Net

Home visits by doctors are once again possible with telemedicine sites becoming available. In some cases, it may even save time and be more affordable. Emerging Internet sites, such as Doctor Goodwell (<http://www.doctorgoodwell.com>), provide patients and doctors with audio and video conference tools for virtual visits. For minor aches, allergies, or head colds, this is an attractive alternative for patients who dread driving to the doctor's office and sitting for long periods in the waiting room.

Sites like eCureMe.com also cater to families who might have financial or physical difficulty transporting a patient to medical offices. For instance, a doctor can check up on a child with

behavioral and chronic developmental problems in the child's home environment, which can actually be more helpful to the doctor. Other potential advantages of these dot-com services include the ability to contact health-care professionals on the Internet 24 hours a day.

### Wireless bedside manner

One avenue some hospitals are aggressively pursuing is converting patient records from paper to an electronic format, which could streamline entering and retrieving patient information. This is a deceptively simple idea that requires a complex approach—there are numerous considerations involved, including assured fault tolerance of networks and patient privacy. In the US, the federal government requires hospital compliance with the 1996 Health Insurance Portability and Accountability Act (HIPAA), which mandates regulations governing privacy, security, and electronic standards for health-care information. One result of this act is that health-care staff can't fax patient's medical records, because a strong possibility exists that the information could be faxed to the wrong number. (For further information on HIPAA standards, see <http://www.aha.com>.)

Still, the incentive is strong to find a way to effectively convert to e-records. The numerous forms health-care professionals fill out per patient can amount to quite a heap. Hospitals are always concerned with space for medical-record storage. Moving to an electronic format can help combat these storage issues, as well as save the

staff duplication efforts. If hospitals store the information on a centralized server, multiple staff can retrieve it.

Several companies are addressing these needs on a variety of levels. AccessPt., for example, is a software solutions provider that delivers secure, encrypted, browser-based patient record information to wireless PDAs. AccessPt. lets physicians access patient information with a PDA using WindowsCE or a palm operating system. Another approach is Mi-Co's Mi-Forms, which offers similar services, with the added benefit that it converts handwriting to digital data.

Some hospitals have also funded research internally, as is the case with St. Joseph's Hospital in Phoenix, Arizona. Their information technology department is testing a remote operation of applications for mobile health care, or Roam device. Roam works with Certicom's virtual private network, Movian VPN, so that the hospital's wireless palm computers can store and retrieve data securely. Now staff can access information about bloodwork, medications, and diagnoses without tracking down the patient's chart. (For more information on the program Roam, see the story "Doctors with Devices" at <http://www.thestandard.com/article/0,1902,23179,00.html>.)

### The brains of the operation

Beyond the paperwork, computers are assisting the medical profession in several areas. Researchers are looking toward pattern analysis and machine intelligence as a means of improving current surgical procedures. An example of this is PathFinder, a new robot manufactured by UK-based Armstrong

Healthcare. PathFinder isn't taking surgeons completely out of the picture, but Queens Medical Center in Nottingham, England is using the robot on a trial basis for image-guided surgery.

PathFinder works by using a scanner image to map out a patient's skull. The surgeon marks a target on the scan. PathFinder contains a camera, which matches positions on the image to positions on the patient's head. The surgeon makes a tiny insertion through the skull, and then the robot gently guides instruments to a specific portion of the brain. The advantage of using the robot is its precision, causing minimal tissue damage. There's hope that it may be able to handle previously inoperable tumors, as well as Parkinson's disease, epilepsy, and possibly stem cell replacement therapy. (For more information, see <http://www.armstrong-healthcare.com/>.)

### Healthy concerns

Invariably, researchers' best efforts are put to the test—not just with a product's efficiency or accuracy, but also with patients' and health-care providers' comfort levels with replacing current processes with computer innovations. All of the what-ifs regarding network safety and security, long-term energy losses, and high accuracy rates will remain valid concerns, as will the eventual need to standardize procedures from hospital to hospital. But in an industry that by its very nature can never be 100 percent certain of diagnoses and cures, integrating advancements with computers is part of the continual process of working toward scientific perfection, efficiency, and standardization of practices. **MM**

## Tech Notes

- NEC and Sony are working on technology that uses fuel cells to turn methanol into electricity and, by 2002, will result in the production of batteries 10 times more powerful than lithium-ion at a comparable cost. The batteries would make it possible for mobile phones and laptops to run for weeks without recharging (*Atlanta Journal-Constitution*, 9 Sept. 2001).
- The California State University system is working with NetLibrary to provide simultaneous access to electronic books for multiple browsers. Previously, only one reader at a time could borrow an e-book, just like a print version. Under the new rules, half of the 1,500 e-books owned by the Cal State system will be available to multiple readers at the same time, at no extra cost (*Wired.com*, 21 Aug. 2001).
- Disney and News Corp have formed an alliance to deliver feature films over the Internet. This initiative, Movies.com, will launch in early 2002. It will distribute video-on-demand over the Internet and target consumers with enhanced cable TV systems capable of receiving on-demand content. Movies.com will release some movies on an exclusive basis for a period of time, often before the normal pay-per-view window, and will include an e-commerce component, pitching videos, DVDs, and movie tickets over its service (*Hollywood Reporter*, 6 Sept. 2001).