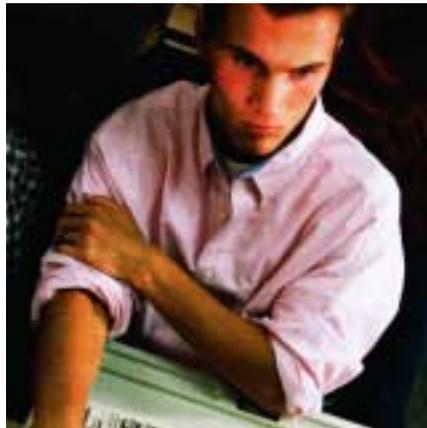


Multimedia Is Coming . . . Get Ready!

You don't get them often: offers that you can't refuse. But that's how I felt when Richard Katz, vice president of EDUCAUSE, called to ask if I would be willing to be the editor of a new EDUCAUSE Review department, "New Horizons," devoted to technology developments. Let's face it, I really enjoy reading and talking about technology. I stay up late and spend much of my weekends immersed in this stuff, so when Richard told me that I could select topics that I found exciting and that might be important on our campuses, how could I say "no"? I hope in the coming months to write about (or get some of you to write about) technology that may already be available but perhaps not in general use, or about cool things that are coming soon.

Multimedia, especially video, is my current topic. It's very hot already, and companies like Apple are going to make sure that it's the next (insanely) great thing on your campus. If there isn't much video on your campus today, I promise you there will be tomorrow. Not all of it will be sanctioned by your faculty or administration. Video conferencing will be the next huge bandwidth consumer on our campus networks. Such growth in use won't happen gradually either. I predict that within the next six to eighteen months, virtually every machine that your students buy or bring to school will have a built-in video camera. If your campus network can't at least handle switched Ethernet to dorm rooms, then start rewriting your campus "allowable use policy" because video eats bandwidth like nothing else. When the UCAID folks wanted to push Internet2/Abilene to its limit, what did they



do? They broadcast HDTV. One HDTV stream used more than 2 gigabits per second! Even if your students don't need or demand HDTV, it won't take too many users with lower-quality VHS-like MPEG-1 video (1.5 Mbps) to saturate most campus networks. Video bandwidth consumption will make Napster and MP3 streaming look like just so much ASCII text.

Some campuses may decide to save bandwidth by scheduling their video programming, encouraging or requiring users to view the same stream. But it's not too early to think about rewiring campus nets for switched Ethernet or even fiber to the desktop. Most of

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us will also need to upgrade routers and switches to handle video. Use of mirror sites and compression techniques may lessen the demands on the national backbone, but new quality of service (QoS) protocols will ultimately have to be implemented, along with accounting and charging algorithms (ugh!) to control usage.

What can we do to stimulate people on our campuses to think about video as the new great technology and not just the latest fad that we need to suppress? Rather than upgrade every dormitory port at Princeton, early last year we established Distributed Media Centers (DMCs) in residential halls and in the library. These DMCs are home to workstations that have been equipped with MPEG-2 cards. To provide the highest-possible full-screen video quality, we used dedicated 100-Mbps connections with no routers from the video server located in the basement of the Computing Center to each DMC. The video server can store nearly one hundred hours of MPEG-1 video and can be easily upgraded to hold more. Although the server can support all video formats, we optimized it to deliver MPEG-1 (for older, VHS-quality videos) and MPEG-2 (for newer, DVD-quality videos). The DMCs have encouraged faculty to integrate instructional videos into the curriculum. The early uses were in language classes, but the demand in other disciplines is growing.

Access to live and archived events will be another important driver of networked digital video. Like several other campuses, Princeton has begun an effort

to present a significant number of university lectures and events over the Internet. I expect that many institutions of higher education will soon be using network video to share instruction and research with distance learners, with busy members of the local community, and with alumni who want to sustain their interests and stay current with recent developments.

On a more global front, the ResearchChannel (<http://www.researchchannel.com>) features leading researchers from every academic discipline. Established in 1996 to provide public access to information about research activities, the ResearchChannel now provides regular Webcasts and is transmitting its original programming round the clock to public audiences via EchoStar's Dish 500 Network on channel 9400.

Now that you are eager to move ahead, or at least to avoid the crush of student video systems, there are five simple steps you should take to share multimedia:

- Step one is acquiring what you want to broadcast (content). You undoubtedly have educational videos, and it is not very difficult to record campus lectures.
- Step two is obtaining permission to broadcast. You will need the lecturer's written approval or an agreement from the content provider. Broadcast permission can be the most time-consuming of the five steps.
- Step three is editing. Although not all video material will require editing, you ought to be prepared to cut out flubs and to add transitions. Fortunately, the cost of good, nonlinear editing equipment has come down drastically in price, from \$20,000–\$100,000 to as low as \$2,000–\$5,000. Indeed, an Apple iMac DV with iMovie can handle basic editing tasks for less than \$2,000.
- Step four is encoding. I suspect that most campuses will start with MPEG-1, though some medical and other specialized uses may require the higher-resolution MPEG-2.
- Step five is serving. To serve your

campus and to scale up reliability, you will ultimately need to acquire a video server from a vendor such as Alex, Miranda, HP, or Sorenson. Video streaming obviously requires a capable network infrastructure and considerable disk capacity for archives. If you have a more limited infrastructure, you may decide to start out with audio-only streaming. An average hour of archived audio-only content will typically consume only 10–20 MB of disk capacity. Apple and Microsoft offer Windows Media and QuickTime streaming technologies that can deliver hundreds of concurrent streams, and they offer their servers, encoders, and players at no charge. For an excellent example of what can be done with audio streaming, check out Northwestern University's Oyez project (<http://oyez.nwu.edu>), which contains multimedia recordings associated with Supreme Court decisions.

RealMedia, currently the most popular encoding standard, offers free software but charges for servers capable of supporting many concurrent users. But don't wait until you have everything in place. Download the software, and try it out with a recorded lecture or a guest speaker. You can download free Realserver Basic software (<http://www.realnetworks.com/products/basicserver/index.html>) that offers twenty-five simultaneous sessions of live video or near-CD-quality streaming audio. Using this software, I was delivering multimedia from my NT system in less than an hour.

It is clear to me that streaming audio and video will soon become a more integral part of instruction and scholarship. In the not-distant future, students and faculty will be attaching audio and video clips to their e-mail and papers. New technologies will permit us to search for speakers and topics, to participate in lectures wherever they might be held, and to stay current with the cutting edge of research. It's coming to a campus near you.



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