# INCORPORATING STREAMING VIDEO INTO INSTRUCTIONAL WEBS

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## ABSTRACT

This Article describes how to incorporate streaming video into instructional Webs. Streaming video is a relatively high quality/low bandwidth format suitable for asynchronous Web-casting. The production system utilizes a digital video camera and digital capture card for recording, and a non-linear video editing system and streaming video producer for post-production in streaming video format.

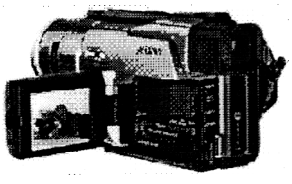
## BACKGROUND

With the deployment of a Real™ G2 streaming video server in the summer of 1999, the New York Institute of Technology realized its goal of providing the capacity for instructors to deliver video lectures in an asynchronous format. This capability augments the institution's synchronous broadcast facilities, which have for years served in the delivery of televised instruction in its distance learning (**DL**) programs worldwide. Links to streaming videos add a significant dynamic to traditional Web-based delivery. Streaming video effectively adds the sense of *presence* previously lacking from online vehicles, such as text-only threaded discussion lists, listservs, or "chat" areas. Watching a recorded lecture is almost as good as being there. Research has shown that 90% of the questions that a participant might have asked during a "live" lecture are anticipated by an audience member in recorded lectures (Willis, 1994). In fact, the ability to time-shift lecture viewing to accommodate the schedules of busy students, and the capacity to pause or replay segments is in the estimation of many a critical development. It may mark, at long last, a fundamental paradigm shift leading to the acceptance of DL as the preferred manner of tuition.

## HARDWARE

A significant drop in the cost of components needed for streaming video production in the past 6 months has put the technology within reach of consumers. The author's forays into this realm began with a lot of reading, shopping around, and discussion with colleagues who had experimented on their own. The best advisory for purchases of system components turns out to be an online source, Deja News at http://www.deja.com. Here, consumers give candid feedback on products based on their experiences.

It immediately becomes evident in a visit to the local video store that the consumer



camcorder world is transitioning from analog to digital. The entree of digital camcorders instantly obsolesces analog technologies. Sony, JVC, and Panasonic, to name a few, offer competitive cameras based on the new Digital8 standard. The author chose a Sony DCR-TRV103, pictured at left (best price at B&H Photo online at http://bhphotovideo.com, $650) thought for an additional $100, the DCR-TRV310 with its larger LCD display is the better value. The LCD screen swivels 180° which is handy

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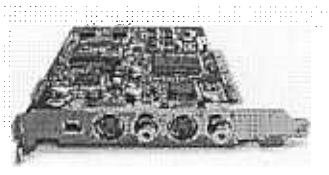
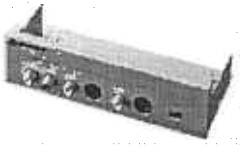
for monitoring oneself while on camera; as a rule, the larger the display, the better. Both models feature S-Video jacks (in addition to standard composite), which are a "must."

The new breed of Digital8 camcorder records *in real-time* seventy minutes of video compressed at a ratio of 5:1 *in the camera.* The video is then played back through an industry standard IEEE i.LINK firewire into the computer via a digital capture card. Capture cards come in analog and digital flavors, but since digital camcorders do the work of digitization and compression in the camera, the task of the capture card is reduced. Thus, it makes *no* sense to buy an analog card these days (they cost on average 3 times as much since they effectively have to "do" what the newer cameras do internally). One can always transfer an analog recording to a digital camera by interfacing through a standard RCA composite or S-Video cable.

Again, after consulting colleagues (one of whom claimed to have wasted over $2,000 on experimental hardware) and consulting Deja News, the author opted to buy a Canopus DV Raptor card, pictured at right (best price, Video Guys at http://www.videoguys.com, $625) which rated better than a comparable offering by chief competitor Pinnacle Corporation. All capture cards at this price-point use the computer's sound card for audio capture/playback (SoundBlaster Live! is the reigning champ at this time, $79). A handy item that turns out to be a must is a breakout box, illustrated to the left. Breakouts allow one to interface the camera to the computer from the front of the system unit, without having to fiddle around with connectors at the rear.





Once you "have it on tape," the Digital8 video source must be recorded by the capture card onto the hard disk. It is necessary to have a drive with sufficient capacity and speed. If your PC was purchased prior to January 1999, you may need to buy another drive. Pentium motherboards prior to that time did not universally support ATA/33 or ATA/66 drive technologies. (If it is touted as a "multimedia" drive, it is probably sufficient.) Since one hour of compressed video translates into 13 gigabytes of storage, buy drives in increments of roughly 13 gigs. A 20-gigabyte drive is a practical minimum for holding the software plus captured video segments. The top contenders in the storage arena are Western Digital (http://www.weterndigital.com) and Maxtor (http://www.maxtor.com). Whatever your choice (Maxtor offered the better price-performance ratio at the time of the author's purchase), ATA/33 drives operating at 5,400 RPM are minimally sufficient, while ATA/66 drives at 7,200 RPM are preferred. If your vintage (pre-1999) motherboard does not support the ATA/66 standard, there is an add-on PCI controller available from Promise Technologies (http://www.promise.com, $49) that will enable your system to accommodate it. A benchmark utility called Raptest is available for free download at the Canopus site (http://www.canopuscorp.com) that will perform a quick test to help you determine if your drive is fast enough. When working with DV data, a sustained transfer rate of at least 4.5 MB/second is required. Ultra Wide SCSI drives (and the requisite controllers) are an expensive, but unnecessary alternative. Most ATA/33 drives have a sustained transfer rate of 12 MB/second, which is more than sufficient.

A final consideration is the video card, which should be an AGP-type adapter. It must support DirectDraw in hardware and DirectDraw overlay to enable monitoring of video

playback in real-time while downloading clips from the camera. Capture card manufacturers will typically list compatible adapters on their Websites for shoppers (see for example http://www.canopuscorp.com/video2/compatibilty.htm). This allows you to pre-select segments prior to capture, saving both time and storage space.

## SOFTWARE

With the digital source resident on-disk, one enters the post-production phase. Most capture cards come bundled with Adobe Premiere™ (http://www.adobe.com), a low-cost, but flexible non-linear video editing system. Premiere allows one to splice segments, add transitions and other special effects, and blend in audio tracks. A title generator is built-in, allowing for rolling credits and the like. The resulting video may then be output in a plethora of video formats (Marchant, 1997), but for streaming video, the usual choices are Microsoft's Audio-Video Interleave (**AVI**) format or Apple QuickTime (**MOV**).

A wonderful utility for capturing computer screen interactions in AVI or MOV format is Hyperionics' Hypercam. This shareware lets you easily select the screen area you wish to record and then "live capture" the region with mouse movements and audio. With a good mike you can simply voice over while recording (http://www.hyperionics.com).

As a rule-of-thumb, it takes at minimum 2 hours of editing to produce one hour of video (Johnson, 1994). It then usually takes upwards of an additional hour to output the resulting production to disk/tape. The process is still not complete, however!

The final step is to convert the video into streaming format. Acting as a filter of sorts, streaming producer programs basically read in the digitized video, and output a streaming version to another file. Here you have two choices: RealVideo™ by Real, Incorporated (http://www.real.com, basic—free, enhanced—$149), and Apple Computer's competing "Streaming QuickTime" (http://www.apple.com, $29.95). Real format is more ubiquitous. The cost of the streaming video *server* software that will furnish your content is another consideration (Jones, 1998). Apple QuickTime streaming server is free of charge while Real Video Server costs $1,995. QuickTime server currently only runs under Macintosh OS/X, however, though its source code is freely downloadable. The source is touted as being cross-compilable onto other platforms, such as Wintel and Linux.

Upon conversion to streaming format, the finished video is ready to be FTPed and hyperlinked (via a standard HREF) to your target Website.

## REFERENCES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