

Excerpted from

Teaching with Digital Video

**Edited by
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Digital video in the classroom has the power to help students grasp, visualize, and explain difficult concepts. The key is to use this technology effectively. *Teaching with Digital Video* shows educators how to do just that in four core curriculum areas: science, social studies, English language arts, and math.

Chapter 6 shows you how to acquire digital video by downloading video from the web, capturing video from TV, and extracting video from DVDs. Advice on searching the Web for digital video, information on file formats, a survey of devices that capture offline video (such as VHS), and recommendations for creating your own digital video will help you to collect the material you need for successful instruction.

CHAPTER 6

Bernard Robin and
Daniel Tillman



acquiring digital video

DURING THE past several decades, an almost complete transformation has taken place in the way information is created, shared, and used. The use of traditional analog tools such as typewriters, phonograph records, films, and standard televisions has declined as they have been replaced by their digital counterparts: computers, compact discs and MP3 files, digital videos, and high-definition broadcasts. Most people consider this new generation

of digital tools to be more precise, better sounding, clearer looking, and in general, superior in overall quality and convenience. Certainly, the ability to easily, quickly, and inexpensively record, edit, and share digital moving images has been revolutionary for amateur videographers of all ages.

Whereas editing and sharing video is addressed in subsequent chapters, this chapter provides an overview of the various ways in which digital video can be acquired:

- Playing digital video on a computer
- Downloading video from the web
- Capturing video from your computer screen
- Embedding YouTube videos on your web page
- Digitizing video from VHS tapes
- Capturing video from broadcast, cable, or satellite TV
- Extracting video from DVDs
- Shooting your own video with a digital video camcorder

The chapter also includes links to a website with some tutorial-style instructions for various methods of acquiring video and sample videos demonstrating how these techniques can be used to create educational multimedia projects.

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A Few Words about Copy-
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Playing Digital Video Clips on a Computer

TO VIEW any digital video on a computer, video-playing software is required. Sometimes, the video player is embedded in a web page, such as on YouTube or on some broadcast network websites that show past episodes of television shows. Otherwise, you will need a separate software program.

Windows Media Player from Microsoft and Apple's QuickTime player are commonly found on desktop and laptop PCs and Macintosh computers, respectively, and new versions with added features are frequently released and easily downloaded and installed.

FLV players, for viewing clips in the more recent Flash video format, are available for Windows and Mac and can be downloaded for free from CNET at www.cnet.com/topic-software/flv-player.html.

Just as digital images can be saved in different file formats such as JPEG, GIF, BMP, and PICT, digital video can be saved in a variety of file formats as well. Common digital video file formats are listed in Table 6.1, and some of the most popular free video player applications are listed in Table 6.2.

TABLE 6.1. Digital Video File Formats

FILE FORMAT	EXTENSION	CHARACTERISTICS
WINDOWS VIDEO	.avi	Older video format for PCs, good quality, large file size
WINDOWS MEDIA VIDEO	.wmv .ASF	More recent video format for PCs, significantly better compression, good quality, smaller files
QUICKTIME	.mov .qt (Mac)	Default video format for Macintosh computers, good quality, large files, should play on both PCs and Macs
MPEG	.mpg .mpeg (Mac)	Versatile cross-platform ability, good compression, good quality, moderate file size
REAL VIDEO	.rm	Popular streaming audio and video format designed to play over the Internet on PCs and Macs, but not usually to be downloaded
FLASH VIDEO	.flv .swf	More recent video format popular on many websites (YouTube, Google Videos), designed to play over the Internet on PCs and Macs, but sometimes can be downloaded, too

TABLE 6.2. Examples of Free Digital Video Players

PLAYERS	OPERATING SYSTEM	FILE FORMATS SUPPORTED
WINDOWS MEDIA PLAYER	Windows	.avi, .wmv, .mpg, .mov, .mp4, .flv
QUICKTIME PLAYER	Mac and Windows	.mov, .qt, .mp4
VLC	Mac and Windows	.avi, .wmv, .mpg, .mov, .mp4, .flv
ALSHOW	Windows	.avi, .wmv, .mpg, .mov, .mp4, .flv
REALPLAYER	Mac and Windows	.rm, .avi, .wmv, .mpg, .mov, .mp4, .flv
FLV PLAYER	Mac and Windows	.flv, .swf

Downloading Video from the Web

THE WEB is a wonderful repository of video clips that span numerous content areas and time periods, but for a variety of reasons, you may want to download videos to your computer rather than watching them online. For instance, you may want to play a video

NEW MEDIA LITERACIES

By Michael Searson and Dina Rosen

Taking advantage of new and emergent media requires a number of new skills from both students and teachers. Here are two important skills for finding and critically selecting digital videos.

EFFECTIVE SEARCHING FOR DIGITAL VIDEOS ON THE WEB

The most common approach to searching for a digital video is “Googling” a title or topic or searching on the YouTube site. However, for students in schools, there are more effective (and safer) ways to conduct high-quality and educationally relevant searches. Most schools impose some type of filter on the Internet to prevent access to the most objectionable videos, but many videos can still be accessed that are inappropriate for school use.

- Tools such as Google’s “custom search” (see www.google.com/cse) can be used to develop targeted search engines relevant to the work at hand. For example, at <http://google.com/coop/cse?cx=005924364887099665360%3Avbxf-mzrv4i>, you will find a search engine that was created to “nurture girls’ interest in science, technology, engineering, and math (STEM).” Visit that site, enter the term “STEM video,” and see what you find.
- By limiting your search to appropriate domains, you are more likely to find educationally relevant videos. For instance, by beginning your search with the phrase:

inurl:k12

and then adding the topic to be searched in quotation marks, you will limit your search to K–12 sites. For example, compare a search on:

barack obama video

to a search on:

inurl:k12 “barack obama video”

You will see, among other characteristics, that the “inurl:k12” search yields no commercial sites and locates a number of school-generated projects within the K–12 domain.

PURPOSEFULLY AND CRITICALLY SELECTING VIDEO FROM SOCIAL-SHARING SITES

In an age of abundant video available to (and often created by) today’s youth, the ability to select videos critically from various networks becomes increasingly important. On the one hand, ratings tools give viewers a sense of how a video is regarded in the social network where it resides. For example, the YouTube site includes a five-star viewer rating system, viewer comments (available both in text and video), information about the video’s author, and links to other videos the author may have posted.

Of course, the evaluation of videos within a social network is determined by those who frequent the network. For example, the hate-speech website <http://martinlutherking.org> is accompanied by a heavily subscribed-to forum filled with distorted, inaccurate, and racist statements about Dr. King. Discussing with students the nature of the social networks within which digital videos are posted can be powerful teachable moments.

offline or outside its web context. Or you may want to extract a short clip, remix the sequence of a video, or combine (or “mashup”) multiple videos.

You probably already know how to download (or save) still images from websites, but downloading video from the web can be a bit more complicated. Not all digital video files found on the web are designed to be downloaded. Many are “streamed,” which allows the video to be delivered to your computer gradually so it can begin playing more quickly; that is, you do not need to wait for the entire clip to be downloaded before playing. The disadvantage of this process is that many streamed video files cannot be easily saved for later viewing, nor can they be transferred from one computer to another. The files are only temporarily stored on your computer and disappear once they have been watched.

Some video repository sites, such as TeacherTube and the SITE Screening Room, provide their own video downloader. The YouTube website (www.youtube.com), which is one of the most popular web resources for finding and viewing video clips, does not. The following section describes a variety of ways to transfer video from the web to your hard drive.

Saving Video to Your Hard Drive

VIDEOS THAT open in a video player on your computer, such as Windows Media Player (Figure 6.1), sometimes may be saved to your computer. An easy way to find out if you can download the video is go to the player’s File menu and see whether the Save or Save As option is displayed. If it is, you may be able to easily save the video clip for later use. The Save option is not always available, often because the owner of the video prefers that it not be downloadable. (Note that not all video players include a Save option; the free Apple QuickTime Player does not, for example, whereas the Pro version does.)

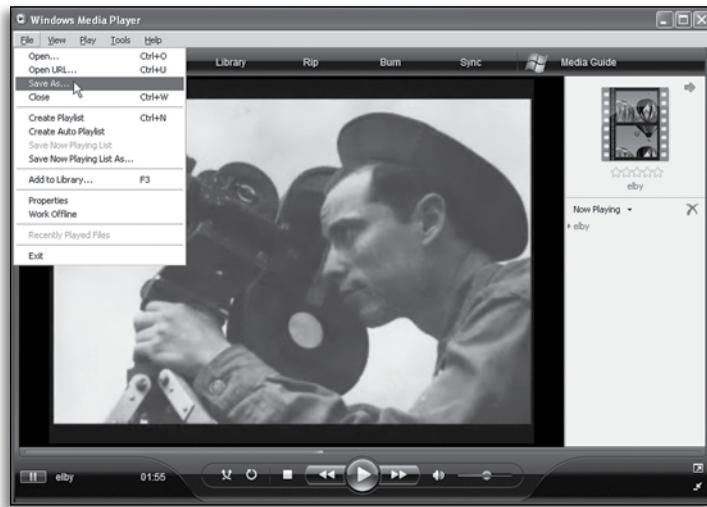


FIGURE 6.1. The Save As option in Windows Media Player is located under the program’s File menu.

Some recent versions of popular video players such as RealPlayer include an option for downloading video clips, including Flash-based videos and some streamed videos, from the web. The free player from www.real.com comes with both a web browser button and a mouse-over feature that allows users to download video clips directly from web pages.

Capturing Video from Your Computer Screen

IF YOU cannot easily download a video from the web, another option is to use screen capture software. These applications allow you to record anything on your computer screen (or any portion of your screen), including cursor movements. Many screen capture programs also allow you to record audio that is playing or to add your own audio narrations to the captured video (using a microphone).

Not only can you use these programs to capture video from the web, but you can also create your own instructional videos, or “screencasts,” for any computer-based activity. Camtasia Studio for Windows, by TechSmith, and Adobe Captivate for Windows are both fairly expensive programs, but they include numerous features not found on other screen-recording programs—the most valuable of which is the capability to edit the video and audio captured with the respective programs. Neither Camtasia Studio or Adobe Captivate are currently available for the Macintosh operating system.

Snapz Pro X (Figure 6.2) is available for Mac users. It includes fewer features than Camtasia or Captivate, but SnapZ Pro is considerably less expensive and is a popular alternative for Mac users interested in creating screencasts. A number of free programs are available as well (see Table 6.3), although they generally do not include editing capability. To edit video captured with these programs, you would need to use separate video editing software.

More information about creating educational screencasts can be found in Chapter 7: “Creating Digital Video.”

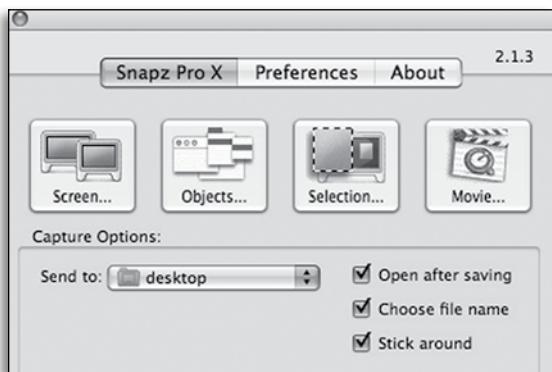


FIGURE 6.2. Screen capture options in Snapz Pro X for Macintosh computers.

TABLE 6.3. Free Screen Capture Programs

PROGRAM	OPERATING SYSTEM	DOWNLOAD LINK
AUTOSCREEN RECORDER	Windows	www.wisdom-soft.com/downloads/downloadfiles.htm
CAMSTUDIO	Windows	www.download.com/CamStudio/3000-13633_4-10067101.html
FREESCREENCAST.COM	Windows	http://freescreencast.com/pages/download
JING PROJECT	Mac and Windows	www.jingproject.com
SCREENTOASTER	Mac and Windows	www.screentoaster.com
WINK	Windows	www.debugmode.com/wink/download.php

Using Conversion Software

ANOTHER METHOD for capturing YouTube videos is to use the free web-based tool Media Converter (found at www.mediaconverter.org). This tool requires you to copy the URL of the video you wish to save (see Figure 6.3) and paste it into the Converter. Then, you select a video format in which to save the downloaded clip (Figure 6.4). YouTube uses the FLV Flash video format, which is common for videos that are streamed or played using a web-based video player. Other popular video formats, such as the QuickTime MOV format, may be a good choice because videos in this format usually play well on both PCs and Macintosh computers.



FIGURE 6.3. Screenshot showing selection of a direct URL to a YouTube video.

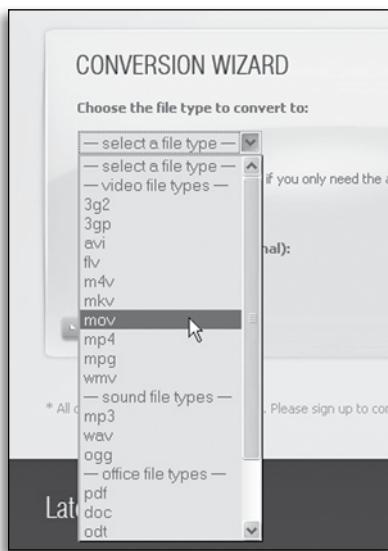
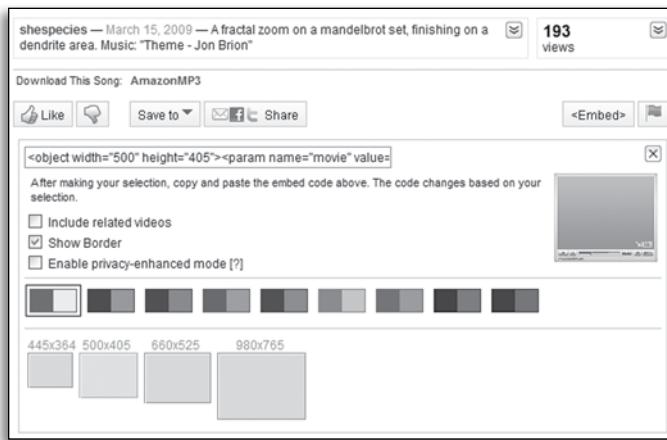


FIGURE 6.4. File type menu in Media Converter.

Embedding YouTube Videos in Your Web Page

YOU MAY prefer to embed YouTube videos in your own web page or in a blog or wiki for online viewing without the distracting comments and related video links included on the YouTube site. You may also find value in collecting multiple videos in one spot or providing opportunities for conversations around specific videos that are open only to your students (see more in Chapter 8: “Communicating with Digital Video”).

The process for embedding YouTube videos is simple and straightforward, although video creators may disable the embed feature. If the embed feature is enabled, copy the HTML snippet found on the YouTube page for the video. Figure 6.5 shows an example of what the HTML snippet looks like.



FIGURES 6.5. Detail of a YouTube page showing the embed code for the video.

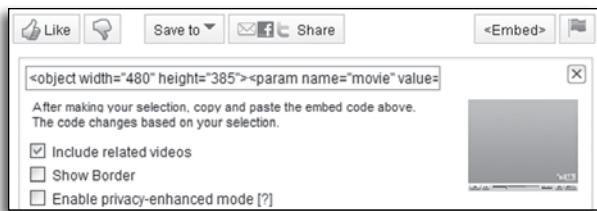


FIGURE 6.6. When you click on the embed code to the right of the YouTube video, a box like this one appears. By default, the “Include related videos” box is checked. We recommend unchecking this box before copying the embed code.

You may also want to uncheck the box that allows other “related” videos to be suggested at the end of the video you’re embedding (Figure 6.6). Sometimes the videos that are suggested are not appropriate for students to see.

MORE ABOUT THE YOUTUBE SITE

By Lynn Bell

YouTube videos have raised social awareness, advanced political careers, and expressed countless teens’ individuality. YouTube’s value today is incalculable, and many students regularly view and upload videos on the site from their home computers. Despite its many positive uses, however, classroom use of the site may require some restrictions.

If you have spent any time on YouTube, you probably have noticed that even when viewing a preselected video on the site, you will encounter comments (sometimes unkind ones), a list of related videos (sometimes with vulgar titles), and advertising. Extracting videos or embedding them in your own website allows you to take advantage of the educational clips while avoiding the distractions.

You should check your school or district policy before sending your students to YouTube to search for videos. Besides the cruel and abusive comments that can be found with some videos, the content of the videos vary widely, from how-tos; laughing babies; and goofy songs to racist rants; dangerous, irresponsible behavior; and sexually provocative acts. YouTube provides flagging tools so that users can advise them of videos that violate site policies, but keeping up with hundreds of thousands of new videos being uploaded every day is not easy.

Your students will definitely benefit from discussions about focusing on the best YouTube has to offer and avoiding the worst.

Capturing Video from Offline Media

IN ADDITION to the enormous amount of digital video available on the Internet, there is an additional, endless supply of video available offline, in such formats as VHS tapes, television, and DVDs.



FIGURE 6.7. One type of VHS video digitizer is the Canopus ADV C110 Video Digitizer.

VHS TAPES

Even though VHS tapes are gradually being replaced by DVDs and other digital video technologies, large numbers of them still exist in households, schools, and libraries throughout the world. Some of these VHS tapes contain video segments with educational value. Transferring VHS video to digital format requires specialized hardware and software. Many different devices and software programs are available that can be used together to extract and preserve video stored on VHS tapes.

Pinnacle creates several easy-to-use and affordable packages. An example is their Dazzle Video Creator, which retails for \$90 and allows you to connect an analog camcorder, VHS player, or DVD player through S-video or RCA cables to a capture device that interfaces with their video editing software (provided). They make a similar package for Apple computers, called Pinnacle Video Capture for Mac, for \$100. They also have the Dazzle DVD Recorder, for \$50, which digitizes from a VHS player directly to a DVD burner. Another company that manufactures analog video digitizers is Canopus, which makes the entry-level ADV C55 and ADV C110 (Figure 6.7).

USING VHS

More information on digitizing video clips from VHS tapes and a sample digital video project using such clips may be found online at <http://site.aace.org/video/books/teaching/acquire/video2.htm>.

The video digitizer is connected to a VCR or analog camcorder, from which it will receive the analog video signal, and then to a computer, which will be used to view the video and complete the digital conversion process. With some products, including those created by Pinnacle, all of the required software for digitizing analog video is included. With products such as those created by Canopus, a separate software program that can capture the digital signal is usually needed (unless the signal is being sent directly to a recording device such as a stand-alone DVD burner). Most commercially available video editing software packages, for example, Adobe Premiere Elements 3 or

higher, work with video digitizers. Free applications such as Windows Movie Maker and iMovie (included with the Apple operating system) also have video capture options available, albeit with fewer editing features.

BROADCAST, CABLE, OR SATELLITE TV

Educationally valuable video clips may also be acquired from broadcast, cable, or satellite television. Capturing television broadcasts requires both a hardware and software solution. Hardware devices, including the following popular models, are sold by many different manufacturers: the Pinnacle PCTV HD TV Tuner, Autumn Wave's OnAir Creator and HDTV-GT Receiver, the Leadtek Winfast TV2000 XP Expert, the MSI Theatre 650PRO TV Tuner, the Diamond Multimedia TV Wonder HD 650 PCI-Express X1 TV Tuner, and the Hauppauge WinTV-HVR 1600 TV Tuner. Prices range from slightly less than \$70 to more than \$200, depending on the level of sophistication of the hardware and included software (Figure 6.8). The more expensive packages have features designed for enhancing recreational use of the equipment that are generally gratuitous for educational purposes.

USING CABLE TV

More information on capturing video clips from cable television and a sample digital video project using such clips may be found online at <http://site.aace.org/video/books/teaching/acquire/video3.htm>.



FIGURE 6.8. One device for capturing television broadcasts is the OnAir Creator, from Autumn Wave

A common feature of all these devices is that they connect to a computer via a USB connection and can receive broadcast television signals over the air or when connected to a cable or satellite television converter box with a coaxial cable. The converter box is used to receive the television signal and tune to a specific station. When the broadcast is complete, the program can be viewed on the computer and captured. In some cases, the device comes with its own software that is used either to capture still frames from the show being broadcast or to record video full-motion video clips. The software may allow you to make changes to the quality of the video and audio, as well as select where the recorded video will be saved.

DVDS

DVDs can also be a good source of educationally useful video; however, most commercial DVDs of movies or television shows contain copy-protection encryption. The process

USING DVDS

More information on digitizing video clips from DVDs and a sample digital video project using such clips are available online at <http://site.aace.org/video/books/teaching/acquire/video4.htm>.

of extracting clips described here works only with DVDs not containing this anti-copying technology. Extracting a video clip from a DVD refers to rerecording a particular segment of the disc, rather than copying an entire disc. In most software designed for extracting clips from DVDs, you must set the start point, the precise place on the disc where you want the video clip to begin, and then set the end point, the precise place on the disc where you want the video clip to end. Once those parameters are selected, the software rerecords the segment, creating a new digital video file.

Commercial software that can accomplish this process includes Cinematize 2, which is commercially available for \$129. Free applications that perform the same basic functions are also available, although they lack some of the more advanced features. They include MagicDisc 2.7, Ashampoo Burning Studio Free 5, AV DVD Player Morpher 3, and HandBrake 0.9

for Mac. (The AoA DVD Ripper SE 5, and the Easy DVD Ripper & Converter 3 are free to try but \$35 to purchase.) The free software is probably sufficient for most educational purposes, and the free-to-try software can always be field-tested before committing to purchase.

Shooting Your Own Video with a Digital Video Camcorder

IN RECENT years, video camcorders have evolved from being very expensive devices primarily used by professional videographers to affordable, mass-market devices used by a wide array of consumers throughout the world. Camcorders that record and play back digital video are commonly found in businesses, homes, and schools and are now a feature on many cell phones. As this technology evolves, digital video recording continues to become even more affordable and easier to accomplish. In this section, the basic features of digital video camcorders are described, along with an overview of current camcorder formats recommended for use in creating educational digital video.

BASIC CAMCORDER FEATURES

Almost all digital camcorders share some common features. They all use some type of storage medium for the recorded video information. Most camcorders can also record

audio along with the video, usually from either a built-in microphone or an external microphone connected to the camera. Beyond these generalities, the price of a digital camcorder is dependent on the level of sophistication of the additional features it provides. To avoid wasting money on unnecessary features, you should know which features are most important for your needs:

- **Lens.** Most consumer digital camcorders (up to \$1,000) have a fixed lens permanently attached to the camera. Prices vary widely, usually correlated to the quality of the optics. More expensive camcorders have increasingly powerful and sophisticated lenses, which affects color saturation, image clarity, low-light adaptability, depth of focus control, and other attributes. Lenses can also differ in their ability to focus at a far distance (telephoto), to focus at a close distance (macro), or to change from one distance to another (zoom). Under extreme conditions, such as recording at night or from very far away, the quality of the lens might be the difference between a useful shot and a useless one. Sophisticated lenses are one of the most underutilized features of many camcorders, however. Don't pay hundreds of extra dollars for a lens that is more elaborate than you really need.
- **Viewfinder.** The viewfinder is the part of the camera you look through to see what the camcorder is recording. Many older camcorders used a through-the-lens viewfinder, which works the same as a traditional film camera. There was a transitional period during which many digital camcorders had both an electronic viewfinder and a through-the-lens viewfinder, but that is no longer the trend. More modern camcorders use only electronic viewfinders, which are actually tiny television screens that display the image the camera is seeing. More advanced viewfinders display wider ranges of motion, up to 360 degrees, so that operators can point the camera at themselves and still see the viewfinder. Be sure to try out the viewfinder on any camera you are considering for purchase and determine whether it meets your needs.
- **Focus controls.** Focus controls allow the camera to adjust the focus of the picture as it is recording. Some older cameras can only be focused manually, usually by turning a ring on the lens, whereas newer camcorders have an automatic focus feature. Consumer camcorders are usually best left with focus features set to automatic even when they do have manual overrides.
- **Exposure controls.** Exposure controls allow the camcorder to adjust the image based on the amount of light entering the lens. Most cameras have an automatic sensor that determines the proper exposure. Even though many camcorders have a manual exposure setting control, it should rarely be used. Today's increasingly sophisticated postproduction tools allow relatively easy manipulation of exposure after recording.

- ***Image capturing device.*** Older video cameras used picture tubes to capture the images they were recording, but today's digital camcorders use electronic chips such as CCD (charge coupled device) and APS (active pixel sensor) that will eventually replace tube cameras entirely. The quality and size of the image capturing device is probably second only to the quality and size of the lens in influencing the price of a digital camcorder. Usually, each sensor on the image capturing device corresponds with a pixel in the resulting digital image. An image capturing device with an array of sensors 480 high by 640 wide is considered standard definition, whereas an array of sensors at least 720 high by 1280 wide is considered high definition. The maximum number of pixels contained in the captured video is directly determined by the image capturing device.
- ***AC power supply and battery.*** All camcorders need power to operate. They can get their power either from an auxiliary AC power supply or from a battery. It is generally a good idea to use the AC power supply when you have access to electricity and reserve the battery for situations where no electricity is available. Some cheaper camcorders operate strictly on batteries (usually AA), but most have an input for an auxiliary AC power supply. A battery provided with a camcorder can vary in size, with a usual running time of 30 to 90 minutes. Larger batteries are often available for purchase but become increasingly heavy and expensive. A 6-hour battery might weigh almost as much as the camcorder itself and cost in excess of \$200. Be sure to gauge your power needs and plan any extra costs into your budget.

CAMCORDER COSTS

High-definition camcorders can easily cost two to three times more than standard-definition versions offering similar features. Consider how the digital video shot on a camcorder is going to be used. If you will be playing the video on computer monitors or standard-definition television screens, a camcorder that records in high definition may not be worth the extra expense.

CREATING VIDEOS FOR ACTIVE VIEWING

By John C. Park

There is a significant difference between “home videos” and high-quality videos that can be used for active viewing and analysis, especially in the science classroom. The quality of the video should not detract from the observations, inferences, or measurements to be made by the students. The creator of the video, whether teacher or student, should use best practice to shoot the original footage for use in the classroom and for sharing with other teachers and students.

Using a tripod. Handheld video cameras usually produce shaky results. Place the digital video camera on a sturdy tripod to reduce any unnecessary camera motion. A tripod with a pan-tilt head is useful for leveling the camera and to center the event in the viewfinder. Be sure to loosen the panoramic handle of the tripod to easily pan left and right if the videotaped event might move out of the field of view of the camera. If the event will not move out of the viewfinder, be sure to center the event in the viewfinder and tighten each handle that controls panning and tilting.

Filling the screen. Videos could be viewed in a number of ways, including projection on a screen for a teacher demonstration, individual viewing on computers, or on portable handheld devices such as iPods. Adjust the optical zoom or the camera distance to fill the viewfinder with the event to be captured. Be sure that the critical parts of the event are large enough to be clearly seen on any viewing device.

Masking the background. Student attention should be directed to the event, not to the background. When possible, mask out the background using colored cardboard sheets behind the event. Also, choose a background color that will allow for the best contrast with the event. You may want to test the video on people who have color vision problems. Something that looks like a good contrast to you may not be perceived as well by others.

Timing the video. Some videotaped events last longer than the students’ attention. If this is the case, create a time-lapse effect using software that will use only a fraction of the frames shot. For example, if only one out of five sequential frames will be used in the video, the event will be displayed five times faster than what the original video captured. On the other hand, if the event happens rapidly, you may want to create a slow-motion effect by adding to the sequence of frames. For example, instead of a sequence of frames 1, 2, 3, 4, the edited version may contain the sequence 1, 1, 2, 2, 3, 3, 4, 4. As a result, the movie should appear to move at one-half the original speed. These video effects can be accomplished using movie editing software, such as iMovie.

On the other hand, if you know you will want to create a time-lapse of a slow event, you may want to shoot the video at a rate other than 30 frames per second. For example, Logger Pro software allows you to shoot digital video at a frame rate of your choosing. When you shoot using a lower frame rate under fluorescent lighting, you may be surprised at the results. Some frames may appear to be lighter than others. Fluorescent lights have a flicker rate of approximately 120 cycles per second and will influence the appearance of the sequential images.

Using additional lighting. Modern digital video cameras have amazing optics that allow video to be captured with little light. However, low light levels may make the video appear grainy. Additional light will reduce this effect. When the event space is small, such as crystals precipitating in a cooling liquid contained in a test tube, you should either set up the camera very close to the event or zoom in. In either case, less light will enter the lens, and additional lighting on the event will brighten the image for better clarity. You may also need to adjust the focus if the camera is close to the event.

(continued)

Adjusting sound clarity. For some videos, both sound and motion are important. When sound is included in the video, think about how to improve its quality. Shooting a video with high-quality sound is easier than editing sound problems out of the movie. Most digital video cameras have built-in microphones that work well when the event is near the camera. External wireless microphones would be useful for events that are farther away from the camera. Be aware of other noises, such as air vents, overhead fans, and animal noises, that could be a distraction in the video or that could degrade the quality of what is to be heard.

Sharing your product. If you plan to share your video with other teachers, you may want to produce a few different versions so they can use it differently. Some teachers may not wish to use the questions you included in the movie title pages and would like to edit the movie using their own questions. Or perhaps others would not want to use the audio you use in your class and would prefer to create their own audio track. Still others may want to use a portion of your video in an online test. Create transportable video that others could repurpose into new activities.

TYPES OF DIGITAL CAMCORDER RECORDING FORMATS

Digital camcorders come in many different types and price ranges, depending greatly on the sophistication of the features previously described. An additional feature that deserves discussion is the recording format used by the camcorder.



FIGURE 6.9. A mini-DV tape.

Mini-DV camcorders. A large number of camcorders record video onto a tape cassette, one much smaller than a VHS tape. Many digital camcorders record video onto mini-DV (digital video) tapes (Figure 6.9), which generally allow recording of either 60 or 120 minutes, depending on which of the two quality settings is used. The mini-DV format is still a popular choice for those just starting out with digital video or those who have inherited an older camcorder. Mini-DV camcorders have become one of the cheapest entry

points into standard-definition recording and can be found under \$200. One disadvantage of mini-DV is that the video must be transferred to the computer's hard drive, which can be a time-consuming process. However, an advantage of this format is that the tapes can be easily stored, which can be useful when important video material needs to be preserved.

Flash memory card camcorders. Flash memory camcorders record to a flash memory card, a common storage medium for digital information that includes a variety of different types from different manufacturers, including secure digital (SD) cards, memory sticks, and compact flash (CF) cards. These media make the video recordings easily portable, as the memory cards can be replaced to increase recording capability and can also be moved to other devices, such as computers equipped with memory card readers. An advantage of flash memory card camcorders is that the footage can be transferred to a computer's hard drive from the flash memory card as a folder full of data files. This is a much faster transfer process than capturing footage, as is required with mini-DV tapes. Further, specific video clips can be transferred individually for maximum efficiency.

Hard disk drive camcorders. Hard disk drive (HDD) camcorders, as the name implies, record video information onto a hard disk built into the camcorder. As with a computer, the information is stored internally, and no external medium is required for the video recording. Many HDD camcorders also include the ability to record to a memory card, so you have two choices for storing the video you shoot. This type of dual recording format is generally marketed as a hybrid camcorder. Like flash memory card camcorders, hard disk drive camcorders can be treated just like an external hard drive by your computer. The process of transferring files to your local hard drive from the camcorder then becomes almost identical to the process of transferring video clips from a USB thumb drive. Similar to the flash memory camcorder, you can transfer entire folders of video clips, or select individual clips to copy.

Mini-DVD camcorders. Some digital video camcorders can record directly to a mini-DVD. The major advantage of recording video on mini-DVDs is that the finalized disc can be played back on most standard DVD players, as well as on computers with a DVD drive. Recordings can then easily be stored on these small discs for later use or for more permanent archiving. However, once a disc has been finalized, it cannot be reused. Some digital camcorders are available that can record to both a mini-DVD and a memory card. DVD camcorders had a period of popularity, but they have now generally been replaced in the market by camcorders that record directly to a flash drive, hard disk drive, or hybrid combination.

Ultraportable camcorders. Like many other technological devices, digital video camcorders have become smaller and less expensive. Ultraportable camcorders, such as the wildly popular Flip Video cameras, are scaled down in terms of features, because

they record video of moderate quality to an internal memory chip. However, connecting the camcorder to a computer to transfer the video is simple via the camera's built-in USB connector. The combination of low price, ease of use, and portability has helped make these devices currently among the best-selling camcorders available. If you are unsure that the moderate image quality of the Flip Video will suit your needs, perusing the many YouTube videos demonstrating the use of the Flip should provide guidance.

Digital still cameras. Many digital still cameras include the capability of shooting video, potentially eliminating the need to own both a digital camera and a digital camcorder. Although the quality of the video shot with one of these cameras may not be as good as with a dedicated digital camcorder, the convenience and reduced cost of having a single piece of equipment may be attractive for many teachers and students. In addition, some digital cameras that record video also include software for easily uploading videos to YouTube.

Conclusion

AS YOU can see, a wide variety of ways exist for acquiring digital video for classroom use. As with all technology, digital video technology is evolving at a dizzying pace. New software programs will continue to appear with regularity, as will new camcorder models and more powerful digital video devices. The information presented here should serve as a starting point for exploring the dynamic opportunities afforded by digital video.

Once you have acquired digital video, regardless of its source, you and your students have many exciting options for editing, remixing, and combining video to communicate the precise message you wish to convey, which is the subject of the next chapter.

More complete information on downloading videos from YouTube and a sample digital video project using video clips may be found online at <http://site.aace.org/video/books/teaching/acquire/video1.htm>.

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July 2010

150 pp. 8½ x 11

Product code: DIGVID

978-1-56484-266-4

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