

Module 2

Digital Still Photography: Issues and Techniques

OBJECTIVES ^{ST.}

Building a fundamental foundation is critical to developing expertise down the road. It's a good idea to start your students down the video production path by teaching them some fundamental still photography techniques. Since most own or will migrate to digital cameras, they also need to understand that medium's limitations.

At the end of this lesson, students will be able to:

- Know about digital still camera issues
- Understand what to look for when purchasing a digital camera
- Improve their still photography skills
- Know what to look for in a scanner

Digital or Film Cameras—What Will Work Best for You

Film has its plusses, but you can't deny the mass migration to digital cameras. That said, digital cameras cannot yet replace film cameras. They have too many drawbacks:

- Shutter lag time (see sidebar: "Consumer Digital Cameras Don't Do Action"). Press the button and wait—for up to two seconds—to actually take the photo.
- Delay between shots—from 2 to 5 seconds.
- They devour batteries.
- Slow auto focus.
- Poor flash metering—they use "pre-flashes" instead of responding to light during the actual exposure.
- Frequent color- or white-balance miscues.
- "Digital focal multiplier"—your 35mm SLR (single lens reflex) camera wide angle lens won't work properly on a digital SLR (see sidebar on "Three Changing Digital Camera Technologies.")
- Rapid obsolescence—buy a digital camera one day and see a better, less expensive model advertised the next.
- Yet another technology to learn with frequently complicated, arcane, and incomprehensible controls.
- Poor low-light capabilities.
- Expensive printers and paper.

But millions of digital camera users all can't be wrong. There are advantages:

- Immediate feedback. Don't like how the photo turned out? Erase it and try again.
- Never buy film again.

- Don't have to pay to process your film.
- Print only the photos you need when you need them.
- Quick and easy image upload to your PC.
- No need to use a scanner.
- Prices are dropping and quality is increasing.
- Give a digital camera to your students and don't sweat wasted film.

Sidebar: Consumer Digital Cameras Don't Do Action

The first time your students try a digital camera, I guarantee they'll wonder what's going wrong.

They'll look through the viewfinder and see nothing. "Oops, I need to turn the darned thing on." Click—pause—on.

That done, they'll compose a shot and press the shutter. Again, nothing will happen. They might press again. A bit harder. Still nothing. They hold the shutter down longer—a second or two—finally a click and whir and an image appears. But it's not exactly the image they thought they were going to get. Certainly it's not that moment, frozen in time, that they visualized when they pressed the shutter.

That moment passed their digital camera by. Why? Electronics, surprisingly, can be slow.

Here's what goes on as they press the shutter:

As with a film camera, a digital camera emits an infrared signal to set the focus, adjusts the autoexposure by changing the aperture (f-stop) and/or the shutter speed, and if it's dark, sends out a small burst of light to determine how much flash to use. At this point, a film camera would snap the picture. But a digital camera has much more work to do.

That digital camera flushes the photo-sensitive computer chip's electric charge to prepare it to receive a new image.

Photons from the image hit that chip. It converts them to electrons, changes them to digital data (typically at least 2 million chunks of color and brightness data) and moves them to an interim storage location. From shutter press to image capture, up to 2 seconds.

Ready to take another picture? Sorry, your students have to wait from 2 to 5 seconds while their digital camera recycles. The camera has to compress that digital information and store it before it's ready to take another photo.

Shooting action photos is just about out of the question. And expecting portrait subjects to "hold that smile" for a second and a half is asking a lot. No longer is it, "Three, two, one, click." Now it's, "Three, two, depress shutter, one, click."

There is one way around this. Spend a few thousand dollars for a professional digital camera. They use "one-click/one-shot", or sequencing, technology.

But even then, depending on the camera, photographers might need to wait more than a second between photos, they can't use the flash (it can't recycle fast enough), the photos might have lower resolution than normal, and the color balance may be way off.

So if they use a digital camera they'll need to make some adjustments. See "Compensating for Lag Time" later in this module.

Digital Camera Buying Tips

The demand for digital cameras continues to grow. Here are some digital camera buying tips you might pass along to those students contemplating a purchase:

- Megapixels—millions of "picture elements" or data points on the light sensitive chip—make a difference. Two megapixels is the minimum for a decent 5-by-7 photo printout, three megapixels for an 8-by-10, and four megapixels for an 11-by-17.
- Storage capacity. Larger megapixel images require more storage space. Note how much capacity comes with the camera and the cost for additional memory modules: CompactFlash, SmartMedia, Secure Media or Memory Sticks. Don't buy cameras with floppy disk or CD storage. They're too slow.
- Try before they buy. The feel, size, and weight of the camera, along with the location of its controls are important.
- Optical Zoom Capability. 2X is the minimum, but 3X is much better. Ignore references to "digital" zoom. That just reduces the resolution of the image. Your students can use Adobe® Photoshop® or Adobe Premiere® Pro for digital zooming.
- Rechargeable batteries and a charger. These are a must. Buying them separately adds \$30+ to the total price. NiMH (Nickel Metal Hydride) rechargeable batteries are better than NiCad (Nickel Cadmium). Always keep a second set on the charger. Many rechargeable batteries tend to lose power during periods of non-use and can lose the ability to recharge.
- Burst—or "sequence shooting"—mode to compensate for shutter and shot-to-shot lag times.
- Check out the software bundle. Some cameras come with some excellent products. Most do not.
- Color LCD (Liquid Crystal Display) panel to preview photos and determine whether exposure or color balance adjustments are needed.
- Macro Function to make extreme close-ups—from an inch or so away from the subject.
- USB PC connectivity. It's ubiquitous.

Importing Digital Photos to Photoshop

Most digital still cameras come with basic image acquisition and editing software. That might suit your students needs for a time, but I believe they will want to move up to Photoshop sooner or later.



Task: Using Photoshop to Download Photos

This is the first of many tasks I present in these DV curriculum modules. In most cases, they are detailed, step-by-step instructions. The best way for your students to get some value out of these modules is to complete the tasks.

One of Photoshop's easy-to-use functions is importing images from digital cameras. It uses WIA, Windows Image Acquisition technology. Here's a quick step-by-step explanation of how your students can send images from their digital camera to their hard drive and into Photoshop:

1. Choose File > Import > WIA Support.
2. Choose a destination on your computer for saving your image files.
3. Make sure Open Acquired Images in Photoshop is checked. If you have a large number of images to import, or if you want to edit the images at a later time, deselect it.
4. Make sure Unique Subfolder is selected if you want to save the imported images directly into a folder named with the current date.
5. Click Start.
6. Select the digital camera from which you want to import images.

**Note: Missing Camera Model?**

If the name of your camera does not appear in the submenu, verify that the software and drivers were properly installed and that the camera is connected.

7. Choose the image or images you want to import:
 - Click the image from the list of thumbnails to import the image.
 - Hold down Shift and click on multiple images to import them at the same time.
 - Click Select All to import all available images.
8. Click Get Picture to import the image.

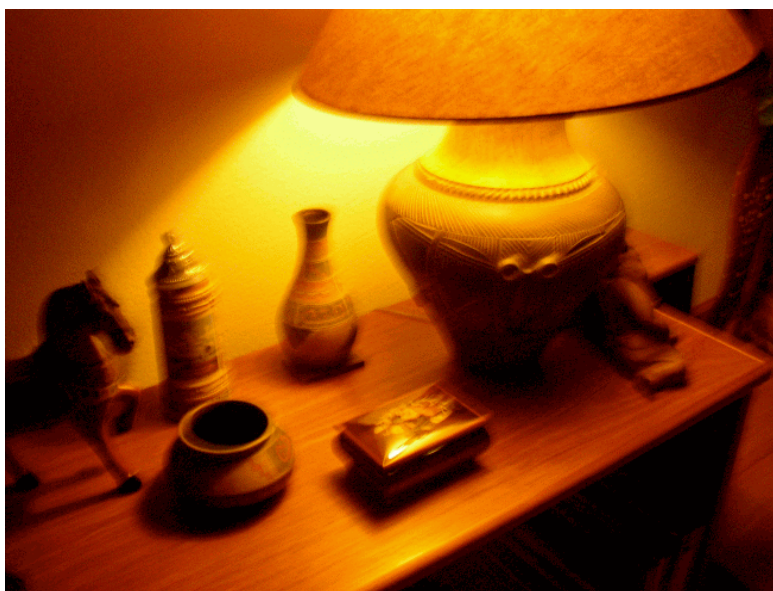
Making High-Quality Photos—Tips and Tricks

Whether digital or film, here are some standard tricks and tips that will help your students improve their picture-taking results.

Putting an End to Blurry Images

The biggest bugaboo in amateur photos is blurry pictures. The principal reason is camera movement. Figure 2.1 is a classic example. Instead of gently pressing the shutter, many amateur photographers abruptly push it, shaking the entire camera. Digital cameras exacerbate this since shutter lag time leads many digital camera users to press down even harder.

Figure 2.1: *When everything in an image is blurry, you can bet camera movement is the culprit.*



Autofocus on Wrong Subject. Autofocus usually sets the focus based on whatever is in the center of the viewfinder. If you're framing a scene with something in the foreground, as in Figure 2.2, the autofocus may "see" the frame, not the subject. Point your camera at the subject, depress the shutter halfway to set the autofocus, compose your shot, and then press the shutter the rest of the way.



Figure 2.2: The autofocus "saw" the cornstalk frame, not the pumpkin-picker subjects.

Composing Your Shots

Get close to your subject. Instead of typical tourist shots of family members off in the distance standing directly in front of some fountain, frame the fountain to fill your viewfinder, then have your family stand close to the camera and a bit off to one side of the frame.

Note: Depth of Field

If you put your friends up close with the fountain some distance away and then focus on your friends, does that mean the fountain will be out of focus? It depends. In daylight, the auto aperture (iris) will be very small creating a deep "depth of field." Foreground and background elements will all be in focus. In low-light settings, the aperture is wide open and the depth of field is very shallow. Then the fountain will be out of focus. Using a narrow depth of field well can lead to dramatic images.

Add a foreground element—something between you and your subject. That gives depth to your images.

Keep your subject off-center. That creates much more visual interest.

Use the “rule of thirds.” As shown in Figure 2.3, divide your image into thirds and place the object of interest at one of the intersecting lines.



Figure 2.3: This image has elements from each of the three previous tips: Foreground element, subject is off-center, and it uses the “rule of thirds.”



Shoot at oblique angles. As with Figure 2.4 instead of straight on, shoot a subject from a non-perpendicular angle.

Figure 2.4: Use oblique angles to add interest.

Other Photo-Taking Tips



Watch back-lit scenes. As in Figure 2.5, your camera's autoexposure will set itself for the light behind your subjects, meaning they'll be silhouettes. Either set the autoexposure on them first and then compose the shot, or use fill-in flash, or do both.

Figure 2.5: *When the sun's behind your subjects, silhouettes may be all you get.*

Use fill-in flash. Just about any time you shoot outdoors, adding flash brings out the colors and details of your subject. Figure 2.6 shows how fill-in flash can overcome the silhouette effect of back-lit shots.



Figure 2.6: *Fill-in flash can overcome backlit scenes (getting them to stop squinting takes much more effort).*

**Note: Flash Range**

Flash has a very limited range—about 10-15 feet. Next time you're at a concert or nighttime sporting event, note all the fans with point-and-shoot cameras taking flash photos from 100 rows back. What they'll get is brightly illuminated backs of heads from a couple rows in front of them. Don't waste your time. The only way to use a flash is to get close to your subject.

Don't overexpose foreground objects.

As shown in Figure 2.7, when using flash, objects close to the camera will be over-illuminated. This is one time when adding a foreground element might not work.



Figure 2.7: *The flash tends to illuminate the closest object, which might not be your desired outcome.*

Avoid stiff poses. Encourage your subjects to do stuff. Walk, talk, point. Anything to add interest.

Keep the background simple. Distractions draw the attention away from your subject.

Use lines to add interest. S-curves and diagonal lines, like those in Figure 2.8, add visual interest.



Figure 2.8: *Diagonal lines help draw attention to the subject (the backlit cloud of dust is kind of a nice touch, too).*

Compensating for Lag Time

In the “If you can’t beat ‘em, join ‘em” department—here are some tips to overcome lag time inherent to digital cameras.

- Turn on your camera before you need it, but, if possible, keep the LCD viewfinder and flash turned off (they drain too much battery power).
- Get used to depressing the shutter release halfway to lock focus and exposure and then depress the shutter all the way to take the picture.
- When shooting action-switch to the burst or sequence modes. However, those modes typically create less than perfect images.
- If you let your subjects know when you’re going to take the photo by counting down from three, press the shutter on “one.”
- Anticipate action. Shoot sooner than normal.

Sidebar: Updating Three Rapidly Changing Digital Image Technologies

Digital camera technology does not stand still. Here are three recent developments:

CMOS vs. CCD. Most still cameras and video camcorders used CCDs (charge-coupled devices) to capture images. Kodak and Canon have challenged that dominance with two ultra-high resolution digital still cameras: The 14 megapixel Kodak DCS Pro 14n and the 11 megapixel Canon EOS-1DS both use CMOS (complementary metal-oxide semiconductor) chips.

CCD chips with the same resolution would be more costly and bulky. And CMOS chips use far less power than CCDs. Another advantage, the CMOS chip has the same frame size as 35 mm film, meaning there is no need for owners of SLR (single-lens reflex) cameras to buy new lenses.

Digital Focal Multiplier. That CCDs are smaller than 35mm film creates a sometimes expensive inconvenience for owners of digital SLR cameras using their film SLR lenses. The smaller image capturing area effectively increases the focal length of any interchangeable lens used on a digital SLR camera. That boosts telephoto lens power—arguably a nifty benefit—but narrows the view of wide angle lenses. Creating distortion-free wide-angle lenses is an expensive art. Buying a new one just for a digital SLR camera can easily cost more than \$1,000.

Olympus, Kodak and Fuji think they have an answer: the Four Thirds System (4/3 System), a standardized lens mounting scheme for digital SLRs. If enough companies sign up, this will resolve the Digital Focal Multiplier issue (you'll still have to buy new lenses), will lead to smaller, lighter lenses, and will ensure uniform lens mounts across all brand lines, something that does not exist for 35 mm SLRs.

Foveon X3 image sensor. CCDs and CMOS technology pales in comparison to the image clarity of Foveon X3 (www.foveon.com). These new chips capture three times the color resolution, feature a simpler design, and offer higher overall performance for digital still and video cameras.

Standard digital camera chips use a mosaic pattern of pixels in groups of three red, green, and blue photodetectors. The resulting image, when viewed up close, looks like a checkerboard.

As illustrated in Figure 2.9, Foveon embeds three layered photodetectors in silicon at every pixel location to capture all colors within each pixel. The result is sharper images with more accurate color reproduction.

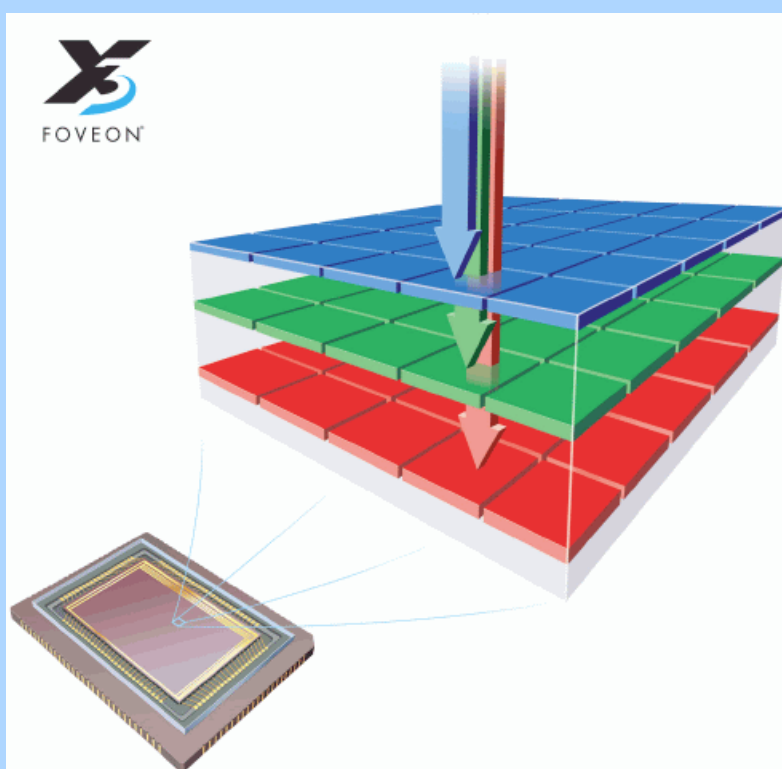


Figure 2.9: Foveon X3 Technology—illustration ©2002, Foveon, Inc.

Foveon expects that several still and video camera manufacturers will begin shipping Foveon X3-enabled cameras soon.

Selecting a Scanner for Your Video and DVD Projects

A scanner is a critical part of you students' video production tool set. Frequently they will need to include non-digital photos, logos, graphics, or other printed material in their projects. To do that, they'll need a scanner.

Now is a great time to buy either their first scanner or one to replace that old clunker in the corner. For \$200 or less, they can get plenty of horsepower.

Scanner Buying Tips

DPI—dots per inch—and color depth. 1,200 DPI is plenty for video production work. 2,400 works well for high-end photo or pre-press projects. 42 or 48 bit color depth is more than they'll ever use. Most image editing software scales down to 24 bits—8 bits per color (red, green, and blue).



Caution: Watch Manufacturer DPI Claims

DPI is supposed to be noted as horizontal by vertical as in 1,200 x 2,400. The horizontal number is the true resolution and refers to the density of sensors in the image chip. The vertical number equals the steps per inch that the scanner motor moves the scanner head. Some manufacturers flip the numbers. So keep on your toes.

CCD vs. CIS. Most scanners use CCDs (charged-couple devices), the same kind of image sensor chips found in digital still and video cameras. A couple companies—Canon and Mustek at last word—rely on CIS (contact image sensor) chips. CIS chips use less power and are more compact, but they have trouble with books that don't lie absolutely flat on the scanner glass. And CIS scanners from Canon and Mustek are slower than the norm. My take: Stick with the industry standard CCD scanners.

Scanning speed. This varies greatly and changes with each new model. I'd suggest checking online at either <http://www.pcworld.com> or <http://computers.cnet.com/> for current bench test results. At last word Epson, H-P, and Visioneer had the best scanning speeds for low-resolution (300 dpi) scans—typically about 20 seconds.



Tip: DPI for TV Display

Generally you don't need to scan at high resolution for display on TV. 300 dpi usually is more than adequate (unless you have a very small photo that you want to display full-screen).

Connection Speed. USB 2.0 scanners are slowly appearing on the scene. If your school's or students' PCs have USB 2.0 capability, then they will see speed improvements, but only for higher resolution images. Otherwise, USB 1.1 is fine.

Transparencies. Most consumer scanners do not handle slides or negatives as a standard feature. They'll need an optional tray—typically costing about \$25.

On-Board Buttons. Some scanners give you all sorts of controls on the scanner itself. They can be very convenient and helpful.

Bundled Software. Most scanners come with the excellent Abbyy FineReader OCR (optical character recognition) software and a barebones image editing package. Even though all scanners these days are TWAIN compliant, meaning products like Microsoft® Word and Photoshop can directly access and operate your scanner, the software bundle usually includes a rudimentary scanner control interface.

Exercises

1. Using the photo-taking tips I listed in this module, have your students grab their cameras (film or digital), head out the door, and take some pictures. Tell them to concentrate less on subject matter and more on techniques. Look for interesting angles, s-curves, and foreground elements. Use the rule of thirds. And keep their cameras steady.
2. Along the lines of Exercise #1, come up with an easy-to-find subject you want to photograph. It could be park benches, car bumpers, or jelly donuts. Then grab your camera and go on a quest for that subject. This exercise forces you to come up with different ways to approach a subject. I did this with gravestones once, and it got pretty weird. But it opened my eyes to new possibilities.
3. National Geographic works with the best photographers in the world. Thumb through a few issues and take a critical look at the photographs. Note the oblique angles, the placement of subjects, strong foreground elements, and action. You may also notice that most exterior photos have long shadows. The light is best early and late in the day.

For complete information about Adobe digital video tools, please visit the Adobe Education Web site: www.adobe.com/education

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