

How technology is transforming  
teaching and learning on campus



# 21<sup>ST</sup> CENTURY CAMPUS REFERENCE GUIDE



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# CAMPUS

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## WHAT IS A CDW•G REFERENCE GUIDE?

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# COMING INTO FOCUS

## ECU'S NEW VIDEO-ENABLED CLASSROOMS

### CHAPTER 1:

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Making Video the Norm

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Taking the Next Step  
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In a classic application of Economics 101, the increasing use of video-related content in the curriculum at Oklahoma's East Central University (ECU) created a demand for video-equipped classrooms that began outpacing supply.

"Our early adopters [of video technologies] had good experiences and told their colleagues," explains Dr. Adrianna Lancaster, ECU library director and the administrator charged with overseeing classroom technology. "Soon, we had the nice problem that our faculty was asking for more technology to better serve their students."

Fortunately, a two-year, \$2.4 million U.S. Department of Education grant awarded in June 2009 is coming to the rescue. ECU won the grant for its Native Voices project, which aims to improve achievement among the one-fifth of ECU's student population that is Native American.

A component of the grant will expand ECU's total number of video-enabled classrooms to nearly 40 percent. "We'll equip 14 additional classrooms altogether," says Renee Hogue, ECU's director of the Native Voices project. "That's a significant increase in just two academic years."

### MAKING VIDEO THE NORM

ECU's technology initiative mirrors a shift throughout higher education toward making video-enabled classrooms the norm rather than the exception.

"Many institutions have fewer video-enabled classrooms than they should," comments industry watcher Jan-Martin Lowendahl. "For many educators, a simple thing like not knowing whether their next classroom will have a projector puts a large dent in attempts at curriculum innovation.

"In other words, technology has to stop being technology and become infrastructure," stresses Lowendahl, a research director with Gartner. "Convenience is key."

Educators agree. "I believe everyone is a visual learner, to some extent," asserts Dr. James Burke, ECU professor of human resources and chair of his department. "So the more real-world ways we can present abstract concepts, the better."

To immediately benefit its students, ECU brought six of the 14 video-enabled classrooms online within two months of receiving the grant. The eight remaining classrooms will be completed during the project's second phase, slated for summer 2010.

"To minimize disruption, we deploy new classroom technology during the summer break," comments Dennis Walden, A/V engineer for ECU. "The second phase of the project includes more classrooms because we're going to install some new technology and café-style furnishing configurations to evaluate their impact on learning."

Audio technology is one area slated for an upgrade. "Educators are using more and more high-definition content, and they're very interested in the quality of the audio as well as the video," Walden

says. "Plugging a couple of speakers into a desktop computer just doesn't cut it."

As a result, a high-definition audio receiver is now part of ECU's standard classroom presentation equipment list, which also includes a video projector, document camera, DVD/VCR combo and presentation remote control.

Rounding out the list is a desktop computer and a touch panel device. The latter permits selecting different inputs for the projectors while the former is connected to ECU's network and provides Internet access.

Mounting and configuring presentation equipment is also standardized. Ceiling mounts hold the projectors while a sturdy podium, custom-designed by Walden, houses all of the other components as well as the cabling and connectivity devices.

"As a fixture in the corner of each classroom, the podiums securely hold as much technology as possible while still being easy to use so that the learning curve is minimal," Walden says. "With the podiums, we've moved away from anything more complicated than popping open the DVD player drawer and inserting a disc."

Of course the podiums also keep the gear safe from theft or misplacement. "We haven't lost anything more consequential than a remote control," Walden affirms.

In fact, safely stowing hardware puts ECU at the head of the security class. "One of the biggest pitfalls for universities is failing to adequately theft-proof their video-related technologies," admonishes Gartner's Lowendahl. "It must be done from the minute equipment is installed."

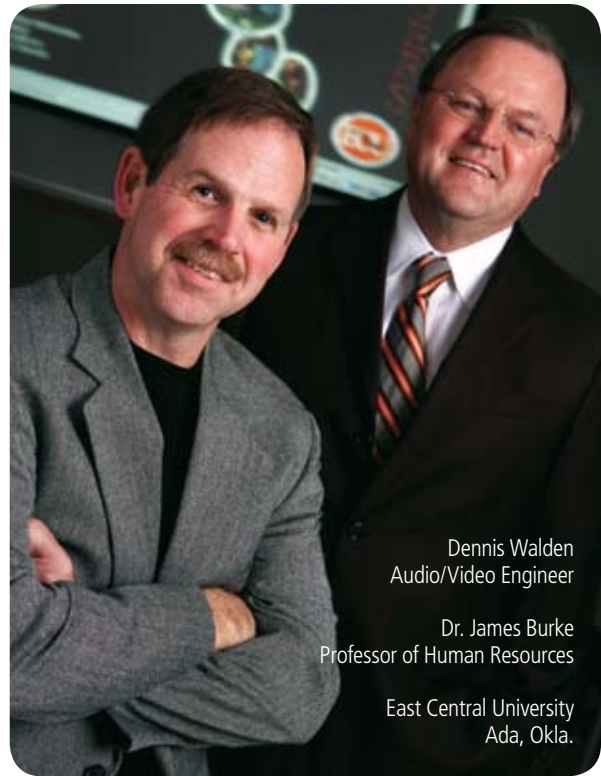
## GETTING THE RIGHT STUFF

Selecting the specific technologies for ECU's new classrooms also followed an established institutional strategy: standardizing on certain models and vendors to balance reliability with features and cost.

"Our provost is very supportive and understands that technology wears out, or becomes obsolete. But the ongoing costs of maintaining equipment that was originally grant-funded is a challenge," acknowledges Dr. Lancaster.

From a faculty perspective, the affect of Walden's dependability-mindedness is well appreciated. "Compared with earlier systems, our current equipment is much more reliable," Dr. Burke says. "It just doesn't go down in the middle of a presentation or a video."

Hence, each new room is receiving a Draper Salara Video Format projection screen, an Epson PowerLite 822+ projector, an Elmo TT-02 document camera, a Toshiba SD V296 DVD/VCR combo, a Sony STR DH500 HD audio receiver and a Logitech R800 presentation remote.



Dennis Walden  
Audio/Video Engineer

Dr. James Burke  
Professor of Human Resources

East Central University  
Ada, Okla.

Standardizing has also provided numerous other organizational and classroom benefits.

For example, using Epson PowerLite 822+ projectors, and the successor model, the PowerLite 825, contributes to the ROI of the entire presentation system.

"Not only can I maintain a larger supply of compatible replacement lamps, but the units themselves also swap out quickly and easily if one needs to be repaired," Walden says. "Plus, all the drivers for connecting with the computers are compatible, as is the command structure for initializing and running the projectors."

Wear and tear is also reduced by standardizing, particularly with respect to the DVD player. "As the single most abused item in a classroom, the DVD player is the single most replaced," notes Walden. "Unlike some others we've tried, the Toshiba SD V296 is a really good device."

Most importantly, standardization makes jumping between ECU's classrooms a breeze. "We've worked hard on the consistency of our facilities from room to room, in order to make the user experience as seamless as possible," Walden emphasizes. "We want people to be able to walk in, ready to teach or make a presentation, and quickly determine what controls the speaker volume."

## INNOVATION ENABLED

Not surprisingly, the expanded number of video-enabled classrooms is encouraging various curriculum innovations. Among them is the utilization of handheld student response devices.

“One of our math professors uses the response devices to gauge comprehension,” Hogue explains. “She projects problem sets on the classroom screen for students to solve privately. As students finish a problem, they signal with the device. By monitoring responses, the professor knows what students understand and what they are struggling with.”

In addition, video-enabled classrooms support soft-skill acquisition. “One goal of higher education is preparing students for their chosen professions, or disciplines, and making them more marketable,” Dr. Burke points out. “Unless students become familiar and fluent with presentation technologies in the classroom, they will be at a disadvantage when they graduate.”

Not surprisingly, the new video-enabled classes are also permitting the expansion of Native American-related curriculum. New offerings include courses on healing rituals and tribal politics.

“These courses will be heavily reliant on video-related technologies for incorporating members of the tribal community in teaching and learning,” says Hogue.

## TAKING THE NEXT STEP

During the project’s second phase, video cameras and lapel microphones will be included in at least some of ECU’s new video-equipped classrooms. This will enable a lecture capture and retrieval system, now in the piloting phase, to be rolled out.

“Viewing or replaying lectures will be proprietary, requiring enrollment or invited-guest status to access them,” says Dr. Burke. “From better serving our numerous special student populations to expanding our distance education offerings, we foresee a wide range of student-centric benefits.”

(For more on lecture capture and retrieval, see the sidebar “Lectures to Go.”)

Regardless, ECU educators emphasize that video technologies are now vital to student achievement. “You can’t just stand and lecture anymore,” says Dr. Burke. “To start lively discussions, you need the capability to replay something you saw on television the previous evening.” ♦

## Lectures to Go

The next wave of video-enabled classrooms at East Central University will include the leading-edge capability known as lecture capture and retrieval.

In a nutshell, this technology records classroom activities, catalogs the content and permits formatting for various types of reuse, whether on-campus or as a component of distance education courses. For security, most systems limit access to enrolled individuals and specifically invited contributors or other guests.

While many are excited by the implications of lecture capture, early resistance has centered on fears that students will stop attending classes altogether. So far, that’s proven untrue.

“Studies suggest that students rarely replay an entire lecture,” says Jan-Martin Lowendahl, a research director with Gartner. “Instead, they search for key words in order to view the portions they didn’t understand. Therefore, they are learning by repetition in ways that are impossible during a live lecture, where students can write approximately 20 wpm [words per minute], while professors speak at about 120 wpm.”

## Boosting Quality and Consistency

At ECU, numerous lecture capture contributions are expected. “First, it will assist with improving course quality and consistency,” suggests Dr. James Burke, professor of human resources. This includes recording lectures by permanent faculty to provide “teach-the-teacher” tools to help adjunct professors at ECU’s three satellite locations with educating at a quality level equal to what is delivered on campus.

In addition, ECU will expand its already-extensive online learning options while utilizing intellectual assets more effectively.

“For example, I’ll be using our lecture capture system for a graduate research course, where research methodologies and statistical procedures don’t change much,” Dr. Burke says. “Then, I can build blended online and classroom courses, where precious classroom time is allocated to the most beneficial activities.”

Sources: East Central University and Gartner



# ILLUMINATING PROJECTORS

## NEW FEATURES, BETTER VISUAL PRESENTATIONS

### CHAPTER 2:

Lumens Are King

Measuring Resolution and Contrast

The LCD vs. DLP Debate

Avoiding the Pitfalls

By delivering eye-popping multimedia detail to groups large and small, today's sophisticated front projectors have become an indispensable communications tool for educators.

"With projectors offering robust features at attractive prices, the learning and work model where a handful of people gather around a single computer is antiquated," comments industry watcher Tom Mainelli.

"Despite the decline in flat-panel display prices, projectors are still the most cost-effective way to display content to a group," continues Mainelli, senior research analyst with IDC. "This holds true for educational institutions."

Not only is there a model for every use and budget, modern projectors also enable the integration of other technologies such as video clips and document cameras.

In fact, the cultural ubiquity of video — from gas station advertising displays to cell phones at sporting events — makes moving pictures vital for holding audience attention. Fortunately, television's transition to being fully digital means audio/video software tools for creating, sharing and playing video are rapidly becoming cheaper and easier to use.

With respect to document cameras (also known as visual presenters), these devices vividly reproduce whatever is placed underneath them in real time and in ultra-fine detail. Some can even create full-motion narrated videos.

But the doc cams only take pictures — a projector is required to display them. "For a variety of situations, particularly for education

or training, doc cams will cause projectors to become absolutely essential," Mainelli points out.

### LUMENS ARE KING

If your audience can't see what you're presenting, what's the point? Therefore, your number one imperative when choosing a projector is matching the viewing environment with the correct light output, which is measured in lumens.

"Regardless of all other factors, purchase as bright an illumination as you can afford," stresses Matt Brennesholtz, senior analyst with Insight Media.

Sub-2,000 lumen units can do the trick when a projector will always be used in a relatively small and windowless space, such as an interior conference room. On the other extreme, for auditorium projectors at larger universities, a minimum of 3,000 lumens is required.

For the majority of uses, the sweet spot is 2,000 to 2,500 lumens. "This allows a room to have enough ambient light for note taking or collaborating," Brennesholtz notes.

Although initial investment is always a key concern, long-term total cost of ownership (TCO) is frequently more relevant for educational institutions.

To contain TCO, keep lamp life specifications in mind. "For example, a projector with a lamp life rated at 3,000 hours will require fewer lamp replacements than a projector with a 2,500-hour lamp life rating," Brennesholtz explains. "Also, factor in your

organization's repair technician charge-backs, which can make the bulb changing process as expensive as the bulb itself."

The exception is LED lamps, which last so long that they can outlive the projectors themselves. "Theoretically, LEDs offer significant TCO savings," asserts Sanju Khatri, principal analyst for iSuppli Corporation. "However, the lumen output of today's LED projectors is insufficient for most classroom applications."

## MEASURING RESOLUTION AND CONTRAST

Where projectors are infrequently used and relegated to very basic presentation duties, a budget-conscious SVGA (for super video graphics array, a resolution standard measured at 800x600 pixels) resolution machine can still be appropriate.

However, industry watchers stress that the times are swiftly changing. "We're not just doing basic presentations anymore," IDC's Mainelli points out. "We're including multimedia and other content, which means resolution matters."

This is particularly true in higher education, where a low-resolution video clip just won't hold students' attention in a PlayStation-enabled world. Nor will your lecture hall realize the full benefits of add-on technology, such as today's multi-megapixel doc cams.

Hence, most purchasers should consider native XGA (for extended graphics array, measured at 1024x768 pixels) the minimum resolution threshold. Fortunately, XGA projectors represent the broadest category of features and functions, making them today's workhorses.

For specialty applications, invest in native SXGA (for super extended graphics array, measured at 1280x1024) or SXGA+ (for super extended graphics array plus, measured at 1400x1050) equipment.

Regardless of what resolution you go with, most experts suggest contrast ratio should be a secondary selection criterion for several reasons.

First, ambient and reflected light heavily influences contrast perception. Ambient light includes daylight and room lighting. Reflected light includes the light that bounces off walls, ceilings, fixtures, furniture and carpeting. And the contrast ratio doesn't measure a projector's capability to distinguish the subtlety between shades, only its ability to provide deep black and brilliant white.

How do you decide what's right for you? Concentrate on feature and functionality needs beyond contrast ratio. Then, test prospective models side by side in your environment to get the best overall image for your budget.

## THE LCD VS. DLP DEBATE

No matter what features you're looking for, liquid crystal display (LCD) and digital light processing (DLP) projectors dominate the market. Coming on the scene are liquid crystal on silicon (LCOS) models, which essentially combine the best attributes of LCD and DLP. (For more, see the sidebar "Tomorrow's Technologies, Today," page 15.)

In a nutshell, LCD functions by passing light through a liquid crystal microdisplay, which modulates the light on the way to the lens. DLP is a reflective technology and uses tiny mirrors to reflect light, which is modulated by tipping the mirrors toward or away from the light as it passes by on the way to the lens. Both technologies offer advantages and disadvantages, which proponents of each have argued over passionately.

If there's a caveat, it's DLP's inherent creation of slight image artifacts, which can cause eyestrain or headaches in sensitive individuals. Here, again, only onsite testing will provide the answers.

Some additional considerations worth noting as you research your purchase options are fan noise and blackboard mode capability.

As the trend toward using projectors in short bursts accelerates, low fan noise becomes increasingly important. "When a projector is turned off, some fans run for only a few seconds while others stay on as long as 30 seconds," comments Insight Media's Brennesholtz. "A fan that sounds quiet at a noisy trade show could sound significantly different in your environment, so evaluate them onsite."

With blackboard mode capability, a projector detects the color of the projection surface and makes adjustments to represent colors accurately. "This permits projecting onto an existing blackboard or a painted wall," explains iSuppli's Khatri. "Projectors with this capability can be used without a dedicated screen."

## AVOIDING THE PITFALLS

No matter where your projectors will be used, heeding the following common projector pitfalls will save your institution money and headaches.

- **Survey your end users:** "Projector selection is most cost-effective when done as an organization-wide effort," advises Brennesholtz. "However, involve a cross-section of end users, from early adopters to technology skeptics. This can significantly improve the likelihood your projector selections will be embraced in the trenches."
- **Too many models:** "It's common for an instructor or department to use their budget to purchase a projector, and soon, everyone

else does the same,” explains Brennesholtz. “This leads to multiple incompatible brands and creates unnecessary costs, such as the inability to purchase bulbs at quantity discounts. Those who already have a mishmash of machines should start developing a correction strategy, now.”

- **One size doesn't fit all:** “An easy trap to fall into is selecting one projector model and then buying dozens,” observes IDC’s Mainelli. “Instead, qualify your environments, test prospective projectors onsite and then standardize on a range of models that match your institution’s conditions.”
- **Networked vs. stand alone:** “If your projectors will be networked, evaluate their wired or wireless connectivity features,” notes iSuppli’s Khatri. “Since they will be administered centrally, also assess remote monitoring and capabilities.”

- **Scrimping on screens:** “Assuming a white wall is good enough can lead to disappointment, even with blackboard mode,” Mainelli warns. “Also, an inexpensive screen may not result in savings because cheap ones can wear out quickly when they are raised and lowered frequently.”
- **Planning for downtime:** “Always have an onsite person trained to troubleshoot,” emphasizes Mainelli. “And, wherever projectors are mission-critical, have replacements on hand for breakdowns or during maintenance outages.”

With all of the forgoing considerations in mind, embark upon your projector journey with the confidence that the range of options ensures you’ll find a model that’s right for you. ♦

## Tomorrow’s Technologies, Today

While the latest innovations tend to carry a higher initial price tag, strategic purchasing can help institutions future-proof their projector investments. Here are four leading-edge technologies well worth considering, today.

### 1. Liquid crystal on silicon (LCOS)

Essentially, LCOS combines the best attributes of LCD and DLP technology. Like LCD, LCOS uses liquid crystals. But the crystals are applied to a mirror, making LCOS a reflective technology like DLP. As a result, most LCOS machines sport minimum native resolutions of SXGA+ (1400x1050 pixels).

With LCOS, artifacts are nonexistent, eliminating the DLP challenge of eyestrain or headaches in susceptible individuals. On the downside, LCOS lamps have shorter lives and replacement bulbs cost relatively more. However, these issues are improving as the technology matures.

### 2. Widescreen and high-resolution

Every new notebook and desktop monitor has a native rectangular 16:10 aspect ratio, while most projector models still use the square (4:3) aspect natively. However, wide-format projector models are now coming on strong.

Conveniently designated with a “w,” native 16:10 projectors offer resolutions equivalent to XGA and above. These include WXGA (1280x800 pixels) and WXGA+ (1440x900). When evaluating, note that some 4:3 models

simulate widescreen using terminology such as “maximum resolution.”

### 3. Short-throw and ultra-short-throw

Short-throw and ultra-short throw projectors address the problem of the projected image being disrupted. Whenever a person steps in front of a projector, the image is blocked for all. Short-throw projectors can sit under four feet from the screen and ultra-short-throw just under two feet, decreasing the opportunity for someone to disrupt the image.

### 4. LEDs and picos

Fanless, whisper-quiet LED projectors theoretically never require lamp changes because the light source will outlast the life of the projector. Although LED projectors are still relatively lumen-poor, recent price drops have made them more attractive.

The latest LED development is the advent of ultra-portable, pocket-size pico projectors. Game-changing for their cost and versatility, picos can receive information from PDAs and cell phones, as well as computers.

Initially targeted for personal and very small group use, a pico’s brightness maxes out at under 10 lumens. Yet picos are attractive for a range of specialty applications, making them a technology to watch.

Sources: IDC, Insight Media, iSuppli

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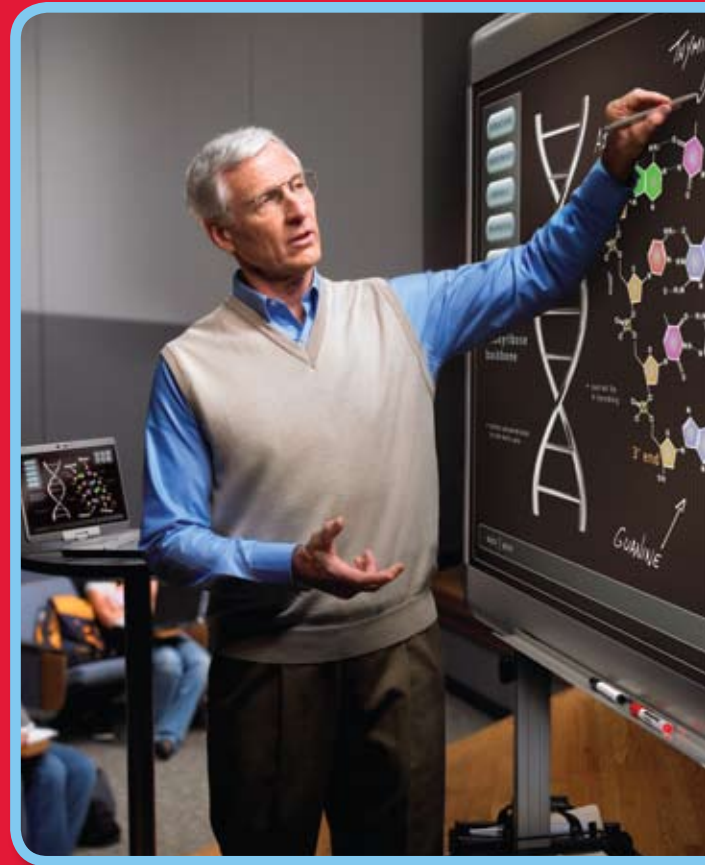
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