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At each of the satellite campuses, lectures are divided between two 60-seat distance-learning classrooms, like the one pictured here, and hands-on courses are taught locally.

Distance Learning Solutions
INTEGRATED SYSTEMS HELP MICHIGAN STATE TACKLE PHYSICIAN SHORTAGE

by Don Kreski

Can advanced AV technology address the national shortage of physicians? Administrators at Michigan State University's College of Osteopathic Medicine think so. They recently opened two new campuses with the goal of increasing their student body by 50 percent. The expansion has been made possible largely through the installation of an impressive array of classroom technology, including distance-learning systems, automated recording and playback systems, and on-screen annotation.

HIGH-DEFINITION DISTANCE LEARNING

All the lecture-based classes at the college are now taught via videoconferencing. Instructors rotate between the main campus in East Lansing; the Detroit Medical Center near downtown Detroit; and Macomb Community College, 20 miles north of Detroit. At each of the satellite campuses, lectures are divided between two 60-seat distance-learning classrooms, and hands-on courses are taught locally.

"The American Osteopathic College Board, which accredits our program, insists that the facilities and the services we offer to students

[on the three campuses] be, if not exactly the same, as close [to one another] as possible," says Joshua Frank, Michigan State's director of application and Web development for health information technology. The distance-learning systems must be excellent so that a student based on a satellite campus will have virtually the same learning experience as one in East Lansing. But more than that, Frank says, "an important part of any university experience is the chance for students to engage, collaborate, and build camaraderie with their classmates. A whole series of student groups meet to study and socialize, and we make the videoconferencing systems available to them so they can operate on a multi-campus basis."

To maintain the best possible signal, Mike Sexton, technology designer for Integrated Design Solutions, designed the AV technology for the new campuses. BlueWater Technologies of Southfield, Michigan, engineered and installed, a system for each room, including a Polycom HDX9004 high-definition codec, three Polycom Eagle Eye HD cameras, two Mitsubishi FL7000U projectors, and a Biamp Audia digital signal processor to mix microphones, handle echo cancellation, and make the sound as good as possible. The system uses

two Crestron TPS-GA-TPI processors in conjunction with the DSP to automate camera and sound controls. Should the lecturer open the class up for discussion, Sexton explains, the students' voices then trigger the cameras and microphones. Once a student is recognized and begins to speak, a camera pans to that location, then zooms and focuses on him or her, and the DSP adjusts to optimize vocals using the process of mix-minus programming.

"Let's say the room is broken into 10 zones, each with its own microphones and ceiling speakers," Sexton says. "If a microphone signal is detected in zone 1, that is, if a student in zone 1 asks a question, it will trigger the camera, turn down the audio for the two speakers in that zone, and turn up the audio in the remaining nine zones. The system ensures that all participants can hear the person speaking yet avert any problems with feedback."

Other nice features of these rooms are motorized, height-adjustable Sound-Craft podiums that enable instructors to stand or sit while they lecture; a wide complement of sources, including a computer, a DVD, a VCR, and a document camera; and annotation of any still or moving image by means of the Crestron TPS-GA-TPI and accessed by a 17-inch Crestron DTT-17 touch panel.

"Annotation is widely used by our instructors," Joshua Frank says. "Let's say an instructor

The control room for the Doctor Patient Relations lab, with a touchpanel and recording gear.

is reviewing an image of a tissue sample. He or she is able to circle, highlight, and emphasize a particular area within the cell structure as it is projected for the class. The same is true for any visual from any source: say a PowerPoint slide or even a video. It is very valuable."

In addition to the two distance-learning rooms, each campus includes a dean's conference room, equipped with similar Polycom- and Crestron-based systems, that is available to administrators, staff, and student groups.

LOCAL LEARNING LABS
Laboratory classes are taught locally. The Detroit Medical Center and Macomb each have a gross-anatomy lab, a histology lab, an osteopathic manipulative medicine lab, and two doctor-patient relations rooms, where students have a chance to practice their people skills in mock examination settings. The systems used in the DPRs are another good example of what Sexton means when he says that the Crestron systems are at the heart of the campuses' success.

"The premise of these rooms is to assess how these student doctors actually interface with potential patients and then help them improve," he explains. In the examining rooms, students alternate between playing the roles of doctor and patient as their instructors take them through a series of situations similar to what they will face when they begin to practice. An automated recording system creates a digital video of each session, which is then accessible for review in any classroom or study

room by means of the IP (internal protocol) network or on tape or DVD.

The technology in the doctor-patient relations rooms is extremely complex but simple to use. "We outfitted each exam room with just one button, mounted on a stainless steel wall plate outside the door," Sexton says. "Right before they walk through the entrance, the students press that button to activate the system, and they'll be recorded from an integrated camera-and-microphone system." Down the hall is a control room that has a DVR, a DVD burner, and four VCRs. Everything is controlled by a Crestron CP2E processor, which ties all the audiovisual equipment together.

When it's time to review these practice sessions, instructors and students have a number

of options. "They can automatically generate a DVD or a VHS tape or access the video on the DVR from any of four seminar breakout rooms, each of which is equipped with a computer workstation connected to a professional-grade LCD TV," Sexton says. Each Sharp PN-465U 46-inch display has a Smart KLX346 touch-interactive overlay tied into the Crestron processor to allow it to start, stop, and pause the media. All video is high definition (1,080p), and the audio is processed through a Rane digital signal processor to ensure the best playback. Here, too, instructors can annotate the video from a 17-inch Crestron touch panel, as they can with any video or computer image in any classroom on any campus.

QUICKMEDIA CATEGORY CABLING
Each osteopathic manipulative medicine lab is also state-of-the art. About one in five medical schools in the United States is an osteopathic school, and these schools differ from traditional medical schools mainly in that they teach manipulative medicine, which is similar in some ways to chiropractic. The osteopathic manipulative medicine lab is a special classroom outfitted with 15 treatment tables on which students can practice their manipulative medical skills on one another.

The instructor's station in each OMM includes three ceiling-mounted Sony BRCH700 pan-tilt-zoom cameras that display manipulative techniques on four 65-inch Sharp LCD monitors. BlueWater mounted these in various locations in the room so that students can refer to them no matter which way they're facing while working on their "patients." "These are really high-quality high-definition cameras,"

Faculty are trained in one of the distance-learning classrooms at the Detroit Medical Center, May 2009. Photo courtesy of MSU College of Osteopathic Medicine, Detroit.

The professor's view of the smart classroom.

Frank says. "When they zoom in, you can clearly see how to touch your patient to replicate what the instructor is doing." A 17-inch Crestron touch panel gives the instructor or an AV technician easy control of the camera and display monitors, as well as a document camera and computer and video sources that he or she may use to show various materials.

The gross-anatomy and histology labs are set up in a similar manner, although no cameras are installed. Here instructors depend on computers, DVD players, and document cameras to display instructional images that illustrate human anatomy or cell and tissue structure (the basis of the study of histology). In the histology lab, Sexton used two Mitsubishi FL7000U projectors and the displays on networked computer workstations to show the images; for gross anatomy, five Sharp 65-inch LCD displays. In each lab, 17-inch Crestron touch panels help instructors find, display, and annotate source material; careful programming of the Crestron processors keeps all operations simple. "We needed to automate these sophisticated rooms using a simple interface," Frank confirms.

One thing that helped keep this complex installation affordable was the use of Crestron QuickMedia cable in all areas except the doctor-patient relations rooms. "Had Crestron's Digital Media platform been available last year, we would have specified it throughout the project," Sexton says. "But where we could use QuickMedia, we didn't have to use all the component, composite, RGBHV, and VGA cabling

A seminar room featuring a Sharp 46-inch display with a Smart touch-sensitive overlay.

that you normally would."

Employing QuickMedia or DigitalMedia cable can save a tremendous amount of money on labor and materials. In the dean's conference room, for example, Sexton says, "we were able to connect all the sources at the table with just one cable: a siamese cable that combines QuickMedia and Cresnet. That was awesome." He was also able to specify the use of a Crestron MPS-300 in the conference room, simplifying installation even more. The MPS-300 combines an audio amplifier, a control processor, and an audio-video switcher, as well as QuickMedia inputs and outputs.

The design process was a long one, Frank says. Planning began in 2006, but the Detroit Medical Center was not complete until summer 2009, and Macomb was not finished until February 2010. "We followed a strict methodology for understanding the needs, what the problems would be, and solutions that would meet and overcome those problems," he says.

One difficulty did crop up with older Crestron processors, which Integrated Design Solutions had specified because of the long time frames in the project. "We took the problem to Crestron, and they replaced all these systems at no charge," Sexton says. "That's why I like specifying Crestron, because they always do the right thing. It's a huge company, but it's a family-owned organization, and that definitely shows in the people they hire and how they conduct themselves."

BlueWater Technologies engineered, programmed, and installed all the AV and control systems. "These were intense programming sessions that the BlueWater people went through," Sexton says, "but it's some of the best programming I've ever seen." Frank agrees: "These rooms are functioning as expected and as designed. Without a doubt, we are meeting our goal of extending this education across Michigan."

INFO

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