Video Walls

**Scenario**

The 12 video walls at Holbrook University serve a range of purposes in support of research, education, artistic expression, and community engagement. Video walls are having significant impact in Holbrook’s classrooms, labs, and lecture halls. Chemistry professor Melissa Adeoye uses a video wall to help undergraduates explore visualizations of complex molecules. The wall is big enough so that she can also project content from student computers as learners collaborate in small groups. “The wall lets me teach in a different way,” Adeoye says. “I can help students visualize chemistry in ways I couldn’t before. At the same time, the wall also helps me nurture interactive learning and student collaboration.”

In a nearby lab, meanwhile, engineers work with researchers in the biosciences to study ultra-resolution 3D visualizations of data sets—renderings that help them see much more of the image than they could see on individual computer screens, in much greater detail. And down the hall, a video wall in a lecture hall helps 500 students, even those in the back row, see details of neurons in a mouse brain.

Faculty and students in the humanities also use the video walls. The size of the walls and their rich color saturation have sparked a raft of new works by the university’s visual artists. Classics faculty use video walls to take students on a virtual field trip to an agora in ancient Athens.

A few of Holbrook’s video walls are devoted to administrative purposes. While prospective students and their parents wait to take a campus tour, for example, a video wall in the admissions office displays videos about campus life. “By design, the videos are intended to impress viewers about how great Holbrook is,” says Director of Enrollment Management Arphelia Draper, “but the sheer size of the display makes them even more impressive.” Draper says the wall also subtly underscores Holbrook’s reputation as a leader in technology research. Elsewhere on campus, a video wall greets library patrons with a steady rotation of campus news and educational videos. In the athletic department, coaches use a video wall to screen game tapes as part of their training regimen.

“It’s not hyperbole to say that video walls are helping Holbrook chart new ground in both pedagogy and research,” says Provost Paxton Ritts. “They promote innovative teaching; engaged, collaborative, and interactive learning; and forward-thinking, interdisciplinary scholarship.”

**1 What is it?**

A video wall is a large-scale ultra-resolution digital display that joins multiple display screens with minimal bezels to create what is essentially one large screen. While the multiple monitors can be tiled to display one large image, the technology also lends itself well to viewing multiple sources at one time. Video walls are linked via software to a computer or other media source. Video walls typically are arrayed as flat-screen planar displays; sometimes the walls are curved. Found in public spaces like stadiums and airports, video walls are increasingly used in higher education as tools for pedagogy and research. Sizes vary. One example consists of 24 HD displays tiled and connected to create a 50-million-pixel screen. Another example combines twelve 55-inch ultra-resolution LED screens. A video wall at Stanford University measures 16 x 9 feet while one at Georgia State University measures 24 feet wide.

**2 How does it work?**

While some video walls operate through proprietary controller hardware, other video walls can be driven by a single PC, running Windows, Mac OS, or Linux, using modern graphics drivers. Using a single PC lowers barriers to entry, supports use of commercial-off-the-shelf software, and makes video walls relatively easy to operate. Universities have invested considerable time and money in the development of software to elicit the most robust uses from video walls. Software developed by the NC State Teaching and Visualization Lab, for example, links users via personal laptops, enabling four different users to project content on a video wall at one time.

**3 Who’s doing it?**

A video wall in the Digital Scholarship Lab at Brown University helps scholars collaborate on data-rich and visually mediated research. Video walls are an essential component in CURVE (Collaborative University Research & Visualization Environment), part of work to create a technology-rich discovery space and digital scholarship center at Georgia State University. Students there, for example, have used video walls to study close-up images of diseased human organs and to take a virtual 360-degree tour of Mayan archaeological sites. Using the IQ-Wall, part of a distributed visualization initiative at the...
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Indiana University Advanced Visualization Lab, students and scholars use ultra-resolution visualization to analyze details in diverse data sets and to study artwork in stereoscopic 3D. The CAVE2 system, located at the University of Illinois at Chicago, uses video walls to help create a virtual environment that immerses users in a 3D cyber world. Visitors there “fly” interactively around a 3D representation of Mars or through a visualization of star data from the European Space Agency Hipparcos mission.

Why is it significant?
While video walls excel for presentations, the perspectives they provide invite users to think in different ways about questions they are exploring. As summarized by the Coalition for Networked Information, “large-scale panoramic displays designed for collaboration can change users’ perspective and reframe and amplify digital content in a shared pixel space.” In terms of their value for pedagogy and research, for example, advocates say that video walls provide what one expert described as “quantitative improvement in video display over a TV or desktop monitor [that] leads to a qualitative shift in analysis.” The ultra-resolution of video walls enables users to view images such as a work of art or a collection of molecules in great detail. The size of a video wall also enables users to juxtapose many different images and multiple sources of information. Video walls stimulate collaboration by immersing many users in the experience of looking at the same images at the same time.

What are the downsides?
Constrained institutional budgets make hard choices about technology purchases even more challenging. Video walls may be perceived as too expensive for some institutions. System enhancements beyond the basics, such as the development of customized software, can incur significant expenditures of money and staff time. If they are not designed properly, video walls might not perform as expected or could become difficult to maintain. In terms of physical space, placing video walls in the right spaces with the right configurations and with the right technology can sometimes pose challenges. Questions of who has access to video walls under what constraints or supervision can also arise, as can issues about scheduling their use. Concerns about access to video walls for all users can affect how they are placed, and video walls present new challenges to providing access to users with disabilities. In terms of content, ultra-resolution video walls work best when content is also high resolution.

Where is it going?
As they become more affordable and more institutions realize their value for pedagogy, research, and information-sharing, video walls are likely to become more widely adopted as vital tools for classrooms, laboratories, and other campus spaces. While initial applications of video walls may have centered on research and their use may have been restricted to faculty and graduate students, applications today continue to migrate to also include more common adaptation by undergraduate students and undergraduate courses. Some users see video walls as an essential component in the development in higher education of applications based on virtual reality and mixed reality. The technology is evolving away from requiring special operator expertise to more “do it yourself” usability. Video walls will continue to be included in broader campus discussions about learning spaces and pedagogy. Work will continue to find better ways to integrate video walls into learning spaces that meet the needs of users with disabilities or learning differences.

What are the implications for teaching and learning?
Video walls help create a dynamic, interactive, hands-on educational environment that enhances research, encourages active learning, and bolsters collaboration between faculty and students. Used for visualization and modeling of large data sets, for example, this technology helps learners and researchers view input with different perspectives, helping them draw new conclusions and deeper analyses, and contributing to the development of new knowledge. Through that capacity, coupled with the immersive experience created by large-scale displays, video walls help learners bridge quantitative and qualitative methods, interdisciplinary exploration, and diverse modes of inquiry to address complex questions across the arts and sciences.