

A Shift to Active Learning Environments

At college and university classrooms nationwide a shift is afoot, with innovative teaching arrangements and approaches creating more active learning environments—and fostering collaborations between student and teacher that are making learning more personalized. Today, Dell is partnering with a range of higher education institutions to speed the transformation. Highlighting examples from multiple universities helps illuminate these newly emerging learning environments.

Indeed, higher ed is replacing older methods and spaces with a new triumvirate of innovative teaching, immersive environments and leading-edge technology—all intended to encourage students to be more dynamic participants in the learning process. These active learning classrooms, with flexible arrangements, shared IT resources, and untethered mobility for both student and teacher are easily configured both in space and time to encourage interactivity, creativity and support different learning needs.

Dell recently worked with faculty and administrators at the University of Oklahoma to create just such an active learning space. Explains Erin Wolfe, executive director of the Office of Strategic Initiatives at the university, “Active learning is a shift from the traditional sitting in a class, listening to a professor lecture, to more of a group-centered collaborative learning space.” Wolfe believes this kind of learning has a significant impact on success after graduation. “When you go into the real world, you’re going to work in a group. You’re going to have to solve a problem with that group, report back, modify, and that’s the skill that we need students to have,” she says.

For Oklahoma, constructing the university’s active learning spaces required a rethinking of the nature of classroom instruction and student interaction.

“There’s lots of questions about what higher ed should look like, what classes should look like,” says Gregg Garn, executive director of the K20 Center for Educational & Community Renewal at Oklahoma. “We’ve been able to think deeply about why are we doing the things that we’re doing, and to think through whether there might be some better ways. Active learning is actually a great example of that. One of the things that we’ve discovered in concert with lots of other research around the country is active learning is much more effective than passive learning.” Indeed, strong



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quantitative evidence reveals that team-based learning in technology-enhanced interactive settings is significantly more effective in promoting learning than the traditional lecture format.

Oklahoma's first advanced active learning classroom, "The Core," was the result of a university-wide collaboration—and served as the model learning space for future campus classrooms. The intent was to create a cooperative learning environment that fully facilitated student teamwork and peer teaching, allowed work to be easily presented for review by fellow classmates and instructors, and equipped students with access to a variety of applications and data sets. Media-rich visualizations and simulations extended understanding. And the physical space, the configuration of workstations, stimulated small-group work and one-on-one instruction.

Says Wolfe, "With that first room we had it up and running in a few months and then used that to do student surveys on, 'How did you like the space? How did you like the experience in the course?' We then used that to help model some of our other classrooms, especially in terms of the technology and how they interact with the technology in the room. Dell and Intel have been very supportive in connecting us with other universities and with some of the other best practices around the nation."

"Dell and Intel bring in an outside perspective," adds Chris Kobza, executive director of Campus and Community Engagement at Oklahoma. "They help us to see the technology that's going to help facilitate learning and teaching."

Admittedly, a number of challenges stand in the way of institutions creating—and sustaining—active learning classrooms. Cost is the chief inhibitor, although the declining price of technology has made the endeavor more affordable. But instructor reluctance to incorporate new technology can be a major impediment. Says Michael

Crespin, associate director of the Carl Albert Congressional Research & Studies Center at Oklahoma, "I was a little scared of doing something different, but I was excited to try something new. I had to adapt my teaching style in a lot of different ways. That includes coming up with new activities, coming up with going away from lectures. So one of the big changes I saw with students is they are really actively involved in what we're doing every day. There was no hiding from their professor or hiding from each other. The students were much more willing to work with each other."

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Many on campus agree that teaching in active learning classrooms is much different from the traditional professor-designed lecture course that is based on "what do students need to know?" Instead, class time is directed by "what do students need to be able to do, and what do they need to know in order to do this?" As a result, most of the learning of course content takes place outside of class, and time in the active classroom focuses on how to use the content for solving relevant, interesting, and significant problems.

Successful shifts to active learning environments often expose students to the expectations of a changing labor force, to provide a myriad hands-on experiences and professional learning opportunities. This multifaceted approach in a technology rich environment helps educators meet the needs—and empower the lives—of today's diverse learners.

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Says Wolfe, “We partner with our Center for Teaching Excellence, which has people who help the professors with curriculum development, with learning strategies for active learning classrooms. That support around curriculum development and managing an active learning class is one of the reasons we have the Risser Fellows. We’re really excited to create a cohort of faculty who are these Fellows who can help each other and really create that community.”

New environments being developed at colleges and universities around the country are validating the idea that active learning spaces create active minds, expanding the boundaries of learning with diverse, tech-rich places that enhance the classroom experience through engagement, cooperation, and new pedagogical approaches. At the University of Minnesota, active learning classrooms are bringing such new dimensions to instruction. Designed to foster interactive, flexible, student-centered learning experiences, and operated using central teaching stations and student-provided laptops, the university’s Active Learning Classrooms (ALCs) are modification of the SCALE-UP (Student-Centered Active Learning Environment with Upside-down Pedagogies) concept that originated at North Carolina State University and the TEAL (Technology-Enabled Active Learning) concept at MIT.

Minnesota’s ALCs feature a 360-degree glass-surface marker board, multiple flat-panel display projection systems, round tables that accommodate nine students each, and a centered teaching station that allows selection and display of table-specific information. Supporting the classrooms is the university’s Center for Educational Innovation, which provides guidance to anyone on campus wishing to take advantage of the interactive spaces, whether they are new to tech-oriented teaching or are already experienced. The Center provides workshops on teaching in an active learning classroom that are tailored to meet specific needs and offers assistance in planning and conducting educational research. One-to-one consultations about

teaching and maximizing student learning address areas such as course design, choice of activities, and use of technology. Many instructors at the university remark that watching someone else teach in the room was the most helpful tool for planning their teaching.

Similarly, at the University of Iowa, classrooms are being transformed to support active learning pedagogies, with the new spaces differentiated from traditional lecture-style classroom by the moniker TILE—Transform, Interact, Learn, Engage. While not all TILE spaces on campus are identical, they share some fundamental characteristics and functionality. They’re interchangeable in that an instructor who has constructed a course to be delivered in one TILE classroom can teach the course in any TILE-designated space. Most of these classrooms include a large monitor display for each student table; large screens and projectors that allow viewing of an image by the entire class; switching technology controlled by the instructor, which allows the isolation of images from different monitor locations; and network connectivity—wireless or wired—for student computers. In larger rooms, microphones are available at each table. And a variety of other technologies supply additional support for presentations and multimedia content, including DVD and Blu-ray players, document cameras, instructor monitors that provide annotation capability, and more.

Significantly, no instructor podium dominates the classroom, nor is there an obvious, traditional front of the room. Furnishings are designed to promote student collaboration: chairs are movable; tables allow students to work in small groups; and ample surfaces, such as whiteboards, glass boards, or slate boards, are provided for larger presentations.

Meanwhile, at Indiana University, a number of active learning environments have emerged in response to faculty requests for classrooms capable of supporting explorations of innovative pedagogies, such as team-based and problem-

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based learning. Formal lecturing in the university's active learning classrooms has been replaced with out-of-class content delivery and in-class group activities that ask students to apply the content to practical problem solving. Like most active learning environments, the classroom has no traditional instructor's lectern, decentering the room, providing greater freedom for teaching, and, with peer monitoring, discouraging students from being tempted by extraneous texting and web surfing. Says Lauren Robel, university provost, "We all know as teachers that we struggle sometimes with our competition: tiny, little, easily hidden screens. Our game, in some ways, has to go up, to compete with the world which can come into our classrooms."

Austin Community College in Texas recognized the need to expand its educational model to include more immersive environments on-campus, using the strengths of both traditional and online classes. As a result, the college built the nation's largest technology-rich learning environment—the ACCelerator—with Dell virtual desktops providing students with computer-aided tasks, guidance, and full access to instructors and tutors.

Although the college already offered a slate of classroom and online courses encompassing a broad range of technical and professional programs, it wanted to evolve its educational model to develop new ways to personalize the learning environment and better meet the diverse needs of both traditional and nontraditional students—students who were older, working, raising a family, and looking for greater flexibility and support in their educational endeavors. Stacey Güney, director of the college's Highland Campus ACCelerator, says "Our students were not being as successful as we would like to see, so we needed to change the way we were providing education in the 21st century. We looked at what really makes learning work and that's one-on-one faculty interaction."

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Today, the college offers classes combining the flexibility and personalization of online adaptive learning, the connectedness of an at-school active environment, and improved results from faculty interaction. The ACCelerator provides students with a technology-rich resource where they can work independently and collaboratively and at the same time have on-demand assistance from faculty, staff, and tutors.

With 604 Dell computer stations, the ACCelerator opened as the nation's largest computer lab. "This is Texas, so we like big, but the ACCelerator is extremely big," Güney exclaims. "Building it was a huge challenge and opportunity."

Says Melanie Dickerman, senior systems administrator at the college, "When I first heard about the ACCelerator, I thought, 'How are we going to support that? How are we going to be able to keep the technology up all of the time?'" The college's IT staff questioned whether managing traditional PCs at that scale would be the most efficient use of resources. Instead, with the assistance of Dell, the college adopted a virtual desktop infrastructure that delivered maximum resources with minimum headaches.

"Virtual desktop infrastructure is a very flexible way of putting a desktop in front of a student without buying very expensive hardware," says Dickerman. "Behind the scenes are nine Dell 720 servers. They have dual Intel

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Xeon processors. Each one of them supports about 120 desktops. If one goes down, all the machines move off that one, and they come up on the other servers. It's very reliable. Everything is redundant. Everything is up all the time."

Dell also provided continuing guidance and support that eased the installation process. "Dell and its solutions center were just incredible," Dickerman says. "Engineers came out here and pointed out options that we had."

To install or modify software, IT staff simply updates the master desktop image. "It would take almost 70 hours for one person to manually reimage traditional desktops in the ACCelerator," says Dickerman. "That number does not take into account any hardware repairs, creation of images, or failures in the imaging process. With our Dell VDI solution, we can instantly update hundreds of desktops without even touching a client."

"Active learning has been a huge success at Oklahoma," Wolfe says. "Our rooms are filled to capacity every semester. There's been a lot of research on active learning that shows that the student outcomes are better. Better in terms of grades, and better in terms of retention of the course material for other courses—and, most importantly, for when they're in the work place."



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