TRENDS SNAPSHOT

The Flexible Campus for a New Era

- Immersive learning
- Flexible spaces with eco-friendly attributes
- An inclusive, welcoming environment
- Metaversities

To solve a hypothetical murder mystery, microbiology undergraduates at Thomas Jefferson University must head to the laboratory. After donning their protective gear, the students extract DNA from samples collected at the "crime scene." Then they stain and examine the samples under a microscope, ultimately matching the DNA with that of the murderer.

While the procedures are standard, the lab is not. Instead of going to a physical classroom on the Philadelphia campus, students can connect remotely to control the hands of a simulated scientist in a virtual laboratory. And gamifying the lab work with a murder

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Partnering with Education to Bridge the Digital Divide

Over the past twenty years of my career, I've worked closely with a variety of leaders in education, and as part of my current role at Cisco, I meet regularly with deans, chief information officers, and teachers. I've seen how educational institutions have gone above and beyond in service to their students and communities these past couple of years – rapidly adapting operations to protect the health and safety of learners and staff and shifting teaching methods at a moment's notice.

After the pandemic pivot toward remote or hybrid learning, universities now have a unique opportunity to regroup and strategically build out the technology foundation for their continued success. The pressures of COVID-19 have indelibly changed the future of education, and the demands of learners and staff have shifted towards a future of increased flexibility and agility via remote and hybrid learning models. Instead of viewing remote learning infrastructure as a "plan B" for snow days or the next virus, our customers are shifting their business models to meet diverse learners where they are at, innovating to provide students, educators, and staff the flexibility they need to thrive.

Core to this is providing broadband access to all. As more devices are connected to the Internet, education and industry must come together to make sure that historically marginalized communities have the same access to broadband as their peers. Solving for this will set teachers and students up for success and will allow school systems to be flexible in responding to future learning trends.

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mystery keeps the students engaged in the lesson plan.

"It's not just an experiment. It's connected to real life," says Manuela Tripepi, the assistant professor of biology who assigns the virtual lab to her classes. Her experience was published in the April issue of the *Journal of Microbiology & Biology Education*.

> **"If there is a college that can't afford the lab equipment to do experiments, we can bring tools to students in the virtual world."**

Virtual labs and other advances in technology are reshaping college campuses across the country, allowing administrators to rethink how they allocate their space and spending. The labs are also part of a fundamental shift in campus culture, one that gives students more options for both how and where they learn. The goal, administrators say, is to improve the college experience by making campuses feel more inclusive for everyone, from first-generation students to veterans returning from service.

Interviews with architects and space-planning experts underscore the desire to appeal to a broader array of students and improve their performance in the classroom. Here are four trends that describe ways in which campus space is evolving.

Immersive learning

Learning is most effective when students are able to participate, according to a number of studies. To that end, virtual labs, such as Tripepi's at Thomas Jefferson University, are increasingly being used to actively engage students both inside and outside a traditional classroom, says Michael Bodekaer Jensen, chief executive of Labster, a Boston-based company that offers over 200 virtual lab simulations, including the ones used by Tripepi. At California State University at Northridge, pass rates in a biology class that incorporated Labster simulations improved almost 19 percent compared with classes without the virtual lab, the company said. At Fisk University, in Tennessee, final course grades for a general chemistry class with Labster labs were 17 percent higher.

Virtual labs especially benefit students at less affluent colleges, Tripepi notes. "If there is a college that can't afford the lab equipment to do experiments, we can bring tools to students in the virtual world."

Technology is behind other types of next-generation learning tools, especially in STEM-related coursework. A state-of-the art digital dome lets astronomy students at the University of Michigan at Ann Arbor see the night sky from any location on earth at any time. Last year, the University of North Carolina at Charlotte installed an Anatomage Table that lets medical students visualize and dissect a three-dimensional image of a life-sized cadaver.

The tools become even more powerful when they're layered with artificial intelligence, says David Johnson, a vice president and higher-education design strategist at SmithGroup, an architecture firm with 19 offices in the United States and abroad. For example, by entering a simulated patient's symptoms and lab results, medical students can use artificial

intelligence to narrow down the field of possible diagnoses.

For now, Tripepi and others see virtual-learning tools as supplementing — not replacing — hands-on lab instruction and classroom learning. However, Johnson notes, their effectiveness in student outcomes will likely accelerate the use of virtual tools in liberal-arts classes in addition to the science and medical fields.

Flexible spaces with eco-friendly attributes

The Society for College and University Planning (SCUP) in August released its 2021 Campus Facilities Inventory in which over half of the higher-education leaders surveyed cited the need for more flexible staff and faculty offices.

"The pandemic exposed the vulnerability of highly purposed building space," Johnson says, since classrooms and faculty space sat empty during the initial lockdowns. Now, many colleges are moving toward "hyper-flexible learning environments with extreme technology capabilities," he adds.

Prototypes of next-generation classrooms are taking cues from theater soundstages, with cameras, microphones, and complex lighting arrays embedded into the design, Johnson says. The setup enables instructors to broadcast their lessons in real time to students on campus and at home. Videos of the sessions are archived for viewing later. Classroom walls will be highly interactive, with the ability to display presentations, students' work and live video feeds.

"Students aren't going to sit in a lecture hall for 50 minutes just for somebody to talk to them. They want to be a part of the knowledge as it's sinking in," says Shannon Dowling, associate principal at Ayers Saint Gross, a Baltimore-based architectural firm that specializes in design for higher-education institutions.

What's more, some colleges now want to let instructors hop to different types of learning environments based on their current lesson plan, be it a lecture, a hands-on activity, or a group project. And the classroom may not be in a building at all. SmithGroup is developing nearly two dozen prototypes for outdoor learning spaces with many of the same capabilities as indoor classrooms. Of the designs, the most sophisticated are open-air pavilions with temperature controls, Johnson says.

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These new learning spaces — both inside and outdoors — are being designed with an eye toward sustainability, such as electricity generated by alternative sources like solar power and geothermal energy exchanges. Minimizing water usage and improving recycling efforts are also key.

An inclusive, welcoming environment

More colleges are having conversations about how physical space contributes to a sense of belonging, Dowling says. In the SCUP facilities survey, which included 88

higher-education institutions across the United States, 48 percent of the respondents said they are expanding multicultural student spaces over the next year to make their campuses more inclusive and equitable.

Dowling's research emphasizes the need for "open plan" design in a number of distinct ways campuswide. Space used for faculty offices could morph into casual meeting areas for instructors and students, with some walled-off partitions for private conversations. Long hallways and other interstitial spaces could go away, making more areas visible to other students and passersby. Dowling describes it as "continuous spaces that can accommodate different activities."

All-gender bathrooms equipped with individual stalls for privacy would also have diaper-changing tables for parents with infants, as well as changing stations for those who are incontinent because of their health or impairment, such as an injured veteran. International students could opt for dorms with kitchens so they can prepare dishes that they're most accustomed to.

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On some campuses, a fundamental change involves relocating sorority and fraternity houses, Dowling says. "Moving them away from center of campus lets schools focus on intentional student life that everyone can take part in and not pay to play."

But even small changes can have a big impact, she adds. Campus signage in multiple languages emphasizes the diversity of the student body. Also under review are the service counters that separate students from the administrative and support staff. Removing that barrier makes the space more inviting to all students, and more accessible to students in wheelchairs in particular.

Metaversities

What remains to be seen is whether students — and in the case of traditional-age students, their parents — will embrace the entire college experience in a virtual world. Last year, Morehouse College in Atlanta launched a twin campus in what has been dubbed "the metaverse." Just by donning a VR headset, students can explore a digital replica of their campus, and their personal avatars can participate in virtual classes with other students in real time. Earlier this year, two virtual-reality companies announced partnerships with 10 colleges across the United States to launch more metaversities in the fall. Proponents of metaversities say the format makes getting a degree both more accessible and more affordable. "I 100 percent believe in this idea of an avatar and an alternative campus," says Dowling, who studied how learning environments can be more inclusive and welcoming as part of a yearlong SCUP fellowship.

Experts say physical campuses won't be replaced by the metaverse. "There's an increasing recognition that peer-to-peer learning and engagement are extremely

important," Johnson notes. But he envisions a future when classroom learning is enhanced by virtual reality and augmented reality, which blends the physical and digital worlds. For example, a history major could virtually board the RMS Titanic or storm the beaches of Normandy.

For now, higher-education institutions are mainly focused on bolstering their technology infrastructure. Among the top issues colleges face is the need to deliver a blended campus with both digital and physical learning spaces, according to Educause, a nonprofit organization that works to advance higher education through the use of information technology. Other challenges cited in its 2022 Top 10 IT Issues report include ensuring data security and improving digital fluency among faculty members.

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