Universities Adapt to Compete

Designers need to help universities adapt to new global demands, teaching methods, and technologies to ensure America retains its lead in innovation

— By Robert Powers, AIA, LEED AP, HOK

To compete in today's global economy, innovation is crucial. America's commitment to innovation and technology has enabled us to lead the world in economic development, thanks in part to the quality of our educational system. Today, that leadership is being challenged, requiring universities to respond with better methods, better technologies and better facilities. Architects have a huge opportunity and responsibility to assist our clients in meeting these challenges.

The truth is that America no longer leads the world in scholastic achievement. A sobering statistic to note is that China and India have more honor students than the U.S. has students[1]. The outsourcing of manufacturing jobs could be followed by an outsourcing of intellectual capital if we are not careful. The United States' future success will be tied to our ability to innovate. America's colleges and universities provide the best environments to shape the next generation of leaders who will help us meet that challenge.

However, in their mission to help America stay competitive in the world market, universities face great ob-

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stacles. For instance, state schools increasingly compete among each other for limited funds. In Missouri, the governor recently announced a $12^1/_2$ percent cut in state funding to the university system, while the California State University system has lost 27 percent of its funding since 2010. This has forced severe cutbacks at a time when educational resources should be increasing. Investing in our education system is vital in order to continuously raise the bar. Instead, competition among colleges is fierce, not only for recruiting students, but for funding as well.

So what is needed to compete in the education market? Great faculties are a must, as are facilities that support both current technology and tomorrow's unknowns. Creating an environment in which both students and faculty are excited to live and learn keeps them engaged with one another and focused on learning. These qualities can set a campus apart from its competitors.

Corporations have realized for years that to attract and retain the best employees, they need to provide a healthy, attractive work environment with a certain level of amenities. Universities wanting to retain the best faculty and students need to provide a stimulating environment equipped with the tools necessary to compete in today's world.

Keeping Current

Anyone who believes they can predict tomorrow's technology is misleading themselves. Not that long ago, a professor told me he could not imagine a time when every student would bring their own personal laptop to class. "Computers are just

too expensive," he said. Today, we are quickly moving past laptops to tablets and other portable (and inexpensive) devices.

Along with the hardware, new software has evolved that enables students to learn at their own pace. New technology has allowed students to stay connected and collaborate with fellow students and teachers across the globe. Distance Learning has given students virtual access to thought leaders in their field of study wherever they are located. One question designers (or universities) must answer is whether or not this new technology is relegated to a few special classrooms or if it is embedded throughout the building?

Both curricula and space will need to change to accommodate these new methods of learning. Think about how the role of the architect and the way we practice our profession has changed since you began your career. There is a greater emphasis on collaboration. Building design now often represents only a portion of the services we provide to our clients. Our academic buildings need to accommodate future unknown technologies and methods of learning that reflect the business world.

I suggest this means we need to design for the general; not the specific. When possible, design more generic and flexible space and less custom single use environments.

Inside The Classroom

The nature of education, how we learn and what we learn, has changed greatly over the past several years. Historically, students were taught by teachers standing at the front of the

class and lecturing to the students. "Chalk and Talk." The chalk and blackboard were replaced with projectors, which were replaced by smartboards, but until recently the same learning process endured.

Today there is a greater emphasis on group learning. We better understand the importance of critical thinking and collaboration over rote memorization. "Chalk and Talk" fills only a small portion of class time. Students working in smaller groups and learning from one another has become the norm. This transformation is not only occurring at the university level, but also in elementary and secondary schools across the nation.

The scale and proportions of today's classroom need to adjust to accommodate the different styles of learning. This translates to larger structural bays and greater floor-to-floor heights to accommodate technology.

This will create a great need for renovation and revamping of existing spaces. Today's classrooms simply do not fit inside many of the older buildings on campus. Fixed seating with tablet arms has given way to more flexible furniture systems that allow classrooms to take on multiple arrangements. But the rooms have to accommodate those arrangements, and many currently do not.

Outside The Classroom

Changes also must occur outside of the classroom to meet these new needs. David Thornburg may have summed it up best in a paper titled, "2020 Vision for the Future of Education" when he said, "In addition to the basic skills of literacy and numeracy, every learner must also master the 'three C's:' Communication, Collaboration, and Creative Problem Solving." These skills are not necessarily best learned in the classroom. Learning must continue outside of the classroom.

Classrooms and corridors often fill the floor plans of many older academic buildings without relief. Walking through these corridors can become an obstacle course of stretched-out legs and backpacks as students have nowhere else to gather. These layouts make it difficult for students and faculty to continue discussions beyond the allotted classroom time.

Multidisciplinary programs often do not foster the casual interactions between students and faculty of the various departments that can lead to

An atrium at the University of Dayton provides a visually stimulating environment for people to gather and continue the learning process outside the classroom.

new insights and collaborations. Instead of just corridors, the circulation space should be similar to a well-designed city with spaces for people to gather, access to food and drink, and a visually stimulating environment.

One of my many memories from architecture school several years ago at Washington University in St. Louis centers on the main staircase in Givens Hall. A dual staircase on either side of the main entrance led to a generous landing with a large operable window above the entry.

This landing was more than just a means to reach the second floor studios—the space became prime real estate and a preferred hangout space. In the days before social media, students were able to monitor and connect with fellow classmates entering and leaving the building. Centrally located, the landing was a magnet for informal interactions between both students and faculty.

These opportunities for continued discourse outside the classroom are at the heart of what I feel represents the very best of the academic experience.

Students learn in many ways. Spaces should be provided for the informal group-study session just prior to test time as well as for more individual and focused thinking, where real understanding of a subject matter occurs.

Well-designed buildings need to accommodate both. Thinking back to the staircase at Givens Hall, this can simply mean a slightly more generous space strategically located within the plan.

The learning process should be celebrated and put on display. Often we find really cool aspects of the program hidden away in a remote lab or classroom. Placing these elements of the program prominently along primary circulation paths for everyone to experience helps to build excitement about the curriculum and provide a better understanding of the school's mission to students and visitors.

Thinking again back to my days in architecture school, many long hours were spent in studio. Back then, we had to head to the student union or leave campus for food and drink. Once a student left the building, the focus on learning was lost. Today, many campuses are including some form of food service inside the academic buildings. These features are natural magnets for bringing people together and keeping the students immersed in the learning environment.

Providing this type of environment can create a budget challenge. If the initial program reflects only the classroom and corridors thinking, the additional space necessary to create a great learning environment can effect

The four-story, 100,000 sq. ft. Anheuser-Busch Natural Resources Building's precast concrete façade houses offices, laboratories, and a 500 seat auditorium at the University of Missouri – Columbia.

the budget. Often, budgets are fixed before this level of development occurs. Try to quantify your space requirements early in the project, ideally during the programming phase, to include the area needed to avoid budget shortfalls.

Several strategies exist that will allow the project to absorb some amount of additional square footage. Simplifying the design of a space often provides greater flexibility over the long run along with lower cost. Specifying less expensive materials that do not compromise durability and maintenance can lead to further reductions.

The Building Façade

One of the most challenging and interesting aspects of designing academic facilities is the need to have an attitude about and relationship with the surrounding campus environment. One approach is to match the vocabulary and materials of the adjacent buildings on campus. This provides unity to the campus and works well in many cases.

Another approach is to respond with a façade that is respectful of the existing campus environment while acceding to today's demand for more efficient and sustainable buildings. Today's buildings are often trying to convey a different message than the more traditional ivy-covered façades of previous years. The more extensive use of glass we see in many modern academic facilities helps meet the need for increased daylighting, often

a key component of sustainable design, as well as communicates a more open and accessible environment to the community.

Limestone and brick are two materials that are found on many college campuses. The University of Missouri at Columbia, where HOK has completed several projects over the years, has two distinct districts - the red campus and the white campus. The original historic buildings of the red campus are defined by the use of red brick, while the use of limestone defines the white campus that developed as the university expanded.

Precast Concrete's Versatility

Precast concrete allows us to economically respond to both of these materials, limestone and brick. Precast concrete can take on a number of textures and colors that either closely matches an existing nearby limestone façade or create a new interpretation that expresses a campus's intent on moving into the 21st century. The use of thin or half bricks on a precast panel can simulate the scale and texture of a hand-laid brick façade while improving the construction schedule, overall durability, and budget.

New technologies and manufacturing methods have increased the efficiency of precast concrete and opened exciting design opportunities. The development of Ultra High Performance Concrete (UHPC) is one of these opportunities. It is extremely durable and offers strengths ranging up to 22,000

psi, allowing the use of thinner panels measuring approximately 2 inches thick or about $1/3$ the thickness of a typical precast panel. This translates to less material needed on the job and less fuel consumed in transport.

UHPC can further extend savings to both foundations and superstructures due to reduced loads. Energy efficiency and moisture management are two of the most crucial elements of façade design today. Rain-screen construction is one method that strives to resolve these issues by providing a continuous uninterrupted air barrier with insulation outside the stud-wall cavity. Typically constructed with lighter weight materials, UHPC makes precast a feasible and durable choice for rain screen façades. Precast concrete sandwich wall panels can also provide continuous insulation within the panel, contributing to a very efficient envelope.

These technologies allow architects to provide their clients with a building façade that will last for years with very low maintenance requirements.

Helping The Process

Chancellors and boards of trustees have to make tough decisions about allocating funding in today's economy. As architects, we can help ease the decision-making process through smart design. Design that creates the types of environments that stimulate both students and faculty adds value to the academic program. Buildings that can adapt over time without expensive renovations or compromise are great assets that help universities stay ahead of the curve and able to embrace new technologies.

By selecting materials that reduce first cost and do not burden the facilities' staffs with excessive maintenance and repairs, funding can be freed up for future opportunities. The design and cost flexibility of precast concrete can help create the façades that will house the great learning environments of the future.

Reference

1. "Does the U.S. realize it's in competition?" by Robert J. Herbold, http://www.case.edu/magazine/springsummer2010/competition.html ■

For more information on these or other projects, visit www.pci.org/ascent.