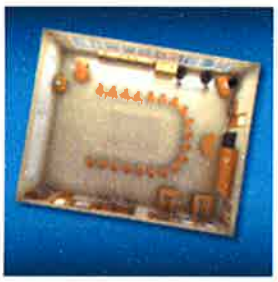
SPATIAL CONCEPTS

Whether facilities are plentiful or scarce, there is a direct correlation between space utilization and sustainability objectives. Here's how to design smart plans that combine form, function, and efficiency.

By Sally Grans-Korsh



A familiar saying among environmentalists goes something like this: "The greenest building of all is the one not built." It's all too true that space is a major cost factor for any campus, whether the institution is building for growth or program modification; operating with excess space; updating, renovating, or maintaining facilities; or monitoring utilities and their usage. Add to the list every other element of general management and operation of classroom, administrative, and event space-most of which fall within the parameters of the business office.

Such facilities costs are at the same time obvious and hidden, if not thoroughly monitored and investigated. For example, during the "arms race" to build attractive campuses with every possible amenity, the emphasis was on the initial capital expense of the project (obvious)—and not necessarily the multiple of 200 or 300 percent of the cost (hidden) accrued by the square footage during the facility's lifetime.

To read the Spanish version of the article, click here.

When it comes to managing costs, campus leaders often emphasize the utilities component of the facilities operational budget. While this approach includes the added benefits of improved overall sustainability and reduction of the institution's carbon footprint, such costs comprise on average only 2 to 8 percent of the overall campus budget. Many other major factors are involved in the overall efficiency of space. Most campuses have already harvested the low-hanging fruit available in energy and utilities. For example, NACUBO's first-ever sustainability survey (see "Sustainability in Practice," for analysis of the survey), found that 69 percent of campuses have already installed LED lighting and 75 percent have installed other devices to reduce energy consumption and cost.

Alternatively, other actions have the potential to achieve much higher levels of savings than what is spent in the utility budget. For example, office space at campuses can account for as much as 30 to 40 percent of the overall campus square footage—often multiple times the space allocated to classrooms and labs. This means that evaluating use, creating efficiencies, and revising programming for different private offices can yield an institution substantial savings.

ANALYZE SPACE ALLOCATION

Office space at campuses can account for as much as 30 to 40 percent of the overall campus square footage.

Often, the real issues of the day-to-day grind of university administration tend to prevent thoughtful long-term visioning of space and its allocation—yet improving management of space will assist in overall financial solvency as well as campus sustainability.

To take space management to the next level, leaders can make further progress by (1) determining relevant trends that influence space needs—and deciding on the most cost-effective responses; (2) establishing a culture of efficiency and sustainability; (3) considering appropriate scheduling to optimize space use; and (4) providing flexibility for evolving curricular needs and teaching techniques.

POPULATION AND PROGRAMMING

According to the 2012 Western Interstate Commission for Higher Education (WICHE) "Knocking at the College Door" report, the supply of the nation's high school graduates is changing. After many years of growth in high school graduation numbers, projections indicate that the country will experience a flat or negative trend in the coming decades. For example, the number of high school graduates grew 22.6 percent between 1997 and 2007. In the next decade, from 2007 to 2017, that growth will have virtually stopped, at a quarter of a percent (0.25 percent). For the following decade (2017 to 2027), the projected decrease is projected at 2.2 percent.

Although the national average indicates high school declines, not all states in the country will fare equally. From 2012 to 2022, Arizona and Nevada will experience strong growth in their public school student population, with 34 percent and 65 percent increases respectively. Other states such as Rhode Island will experience a 22 percent *decline* in their incoming student population; New York's will fall by 10 percent; and Connecticut's by 5 percent. The District of Columbia will see the sharpest decline in public high school graduates between 2012 and 2022, at 26 percent.

BE ENERGY EFFICIENT

An aggressive sustainability and energy plan can lead to 10 to 25 percent improvement in energy use.

Whether declining or increasing, these statistics are daunting as they relate to campus space excesses or additional needs. Add to this the fact that prolonged unemployment has led to adult learners returning to school to complete their degrees or be retrained in new fields-often attending the institution part time. As noted in "Dawning Demographics," in the July-August issue of *Business Officer*, "'Projections of Education Statistics to 2021,' published by the NCES's Institute of Education Sciences, reports an increase of 32 percent in enrollment of students 35 or older between 1996 and 2010. That number is projected to increase by another 25 percent between 2010 and 2021."

Add the influx of military veterans receiving education benefits under the Post-9/11 GI Bill, and these combined trends point to the importance of space evaluation and redistribution.

Wide open spaces. Departments spread out in unused spaces, classrooms used less than a handful of hours a week, or offices left empty or used for storage still need ongoing maintenance and renewal, not to mention utilities.

On the positive side, space can certainly be used for the institution's financial gain if converted, for example, into K–12 expansion, city or county libraries, or other governmental offices. At Riverland Community College, Austin, Minnesota, Judy Enright, physical plant director, has doggedly worked to lease out more than 30,000 square feet of underused space to complementary partners. For example, the college converted 10,000 square feet of available space to a federal and state Workforce Center, while also providing services to the unemployed and under-employed. This approach serves the general population and also benefits the college, as the center is a direct recruitment conduit for the college's programs.

The college executed additional leases with a local nonprofit public television access group, and the campus collaborated with industry and community partners to fund a $3 million renovation resulting in a 17,000-square-foot day-care facility to serve the region. "Having more people coming to the campus assists our presence in the community and also benefits areas like our cafeteria, bookstore, and vending machines," says Enright.

READ AN ONLINE EXTRA

For more information on space use, read "Some Space Allocation Surprises" in *Business Officer Plus* at www.nacubo.org.

Examining space analysis for efficiency can result in a number of other options for improvement. In addition to its unique partnerships, Riverland mothballed two auditorium-style classrooms that were not in use and demolished some inefficient outbuildings. The combination of demolition, renovation, and repurposing—as well as joint sharing of space—has resulted in more robust and productive use.

Classroom crunch. Unexpected demand has tremendous cost impact when it calls for new structures. According to the 18th Annual College Construction Report by College Planning and Management, the median cost (which can vary by region and local economy) to design and construct a new classroom building is approximately $353 per square foot. Thus, even a small addition for offices or classrooms of, say, 2,000 square feet, can cost more than $700,000. Yet, as noted earlier, building costs are only a fraction of the long-term cost obligation. Sightlines, a higher education consulting firm, estimates deferred maintenance cost at 5 percent a year, in addition to the $1.50 to $5.00 per square foot utilities cost.

Timing is an additional problem when the need is for immediate growth. It is rare that significant space can be built in less than a 6- to 10-year cycle. Obviously, public colleges must initiate legislation; for private colleges, fundraising of this level requires long lead time. Leasing space is an option, but in tight urban areas that may be too costly.

Reuse and renovation are often the best options. Queensborough Community College, Bayside, New York—part of the City University of New York (CUNY)—has taken a two-pronged approach to improving space efficiency in light of a 43 percent increase in full-time students from fall 2006 to fall 2011. With nearly 12,000 FTEs compared to the original master plan's projection of fewer than 6,000, it was critical for the college to study its space use and consider what opportunities might be available.

Sherri Newcomb, vice president of finance and administration, led the effort, with Marc Carpentier, director of research and budgeting planning, devoting time for data analysis that would result in better understanding of department needs. Using scheduling software, the college analyzed room size and type, seating arrangements and capacity, and daily hours in use. The resulting data became the basis for better alignment and outfitting of space for programming, and significant scheduling changes.

Providing flexible furniture that could be converted from computer stations to drafting tables allowed for three renovated classrooms now used for multiple programs. Mobile stools turned traditional labs into areas for classroom lectures. These two changes, plus a few schedule revisions, constituted the college's first improvement phase—thus avoiding the building out of 14,000 square feet of new or significantly renovated space.

The second prong was in the form of centralized scheduling—with stakeholder agreement—further eliminating the need for a projected 9,000 square feet of new classroom space. The two projects saved the campus from the need to build 23,000 square feet of new construction at an estimated $10 million dollars in capital and operational expense. Newcomb notes: "Any resource reallocation project is perilous. The great benefit of the analytics we used was that the information created a platform from which we could begin rational and informed discussions about how we were using this scarce resource—space."

AVOID BUILDING COSTS

Flexible furnishings and schedule revisions helped Queensborough Community College avoid building out 14,000 square feet of additional space.

The key to the project's success, she says, was working closely with each academic department. "We did not go in and try to do a hard sell based upon the numbers. Instead, we tried to learn as much as possible about the operational needs and challenges of each

department. We then worked collaboratively to develop solutions to meet the needs of the department, while allowing the college to improve its space utilization."

CULTURE OF EFFICIENCY AND SUSTAINABILITY

Utilities, operations, and maintenance all reflect the institution's physical assets. Efforts to lower these costs reflect the institution's culture and attitude toward financial stewardship. An aggressive sustainability and energy plan can lead to 10–25 percent improvement in energy use. For example, the Tennessee Board of Regents recently awarded a contract to provide energy-efficient upgrades at 16 higher education facilities, with more than 5.25 million square feet of space. Annual utility costs of more than $7.4 million will be reduced by some 30 percent through energy control upgrades, water conservation measures, variable pumping systems, heating and air conditioning upgrades, and lighting improvements.

Similarly, the recent NACUBO white paper, "Leading the Nation to a Safe and Secure Energy Future," reports that the University of California Davis saved an estimated $3 million annually in electricity costs with energy-efficient lighting projects, in addition to savings from reduced cooling and maintenance costs. (Read the entire white paper by going to www.nacubo.org and entering "Leading the Nation" in the search box.)

Campuses committed to a culture of efficiency are finding creative ways to curb energy use, including:

- **Releasing and repurposing.** At the rural campus of Minnesota West Community Technical College, Jackson, an innovative project proposes to sell a building, located in a flood zone, and reuse an existing and underused space at the main campus to promote a technical line-worker program. The college plans to renovate this obsolete space, converting it to an energy-efficient environment that saves students commute time to the more remote location and reduces the campus's carbon footprint.
- **Sustainability synergy.** Campuses that make good use of space realize greater efficiencies in utilities and overall "density." Further, a distinct synergy often occurs when people work together on mutually beneficial opportunities. Such was the case at Mesabi Range Community and Technical College (MRCTC) in Virginia, Minnesota. A declining student population resulted in excess space at one campus; emerging program needs challenged an adjacent campus; and the several institutions felt an overall impetus to fulfill workforce regional needs.

Campus leaders came up with a progressive solution involving two other campuses: A two-year campus, Itasca Community College, Grand Rapids, Minnesota, had run out of space; and a four-year state university, Minnesota State University Mankato, was interested in expanding a four-year engineering degree program. The idea: The first two years of the engineering degree would be taught at Itasca (approximately 40 miles from Virginia), and the last two at the Virginia campus, which is located near numerous mining companies that offer student internships with potential full-time employment. The collaboration involves codirectors and faculty from both the Itasca and Mankato institutions.

The first phase of the three-way project was the renovation of 12,000 square feet of space and a lab, authorized by the state legislature in 2010. Forty students from this 2 + 2 program graduated in 2011, and 93 percent were immediately employed in the state's mining region.

Mike G. Johnson, recently retired provost from Itasca, notes, "This program is unique, including three campuses that ultimately reused and right-sized one campus, while benefiting both the students and the workforce by retaining qualified engineers in their own region." Sustainability is forged from reusing existing underused space, says Johnson,

FLASHBACK ... 34 YEARS AGO

In a March 1979 *Business Officer* article on a coming enrollment shortfall ...

"Drastic declines in the number of traditional college-age students are unavoidable in the decade of the 1980s. Loss of the traditional student may result in a financial crisis for colleges and universities, unless steps are taken to develop strategies to minimize the financial impact. College and university

as well as not duplicating food service, library, computer labs, or wellness areas. The project further reduced carbon footprint issues by eliminated commuting distances and aligning internships with the workforce.

business officers should plan now to develop strategies to cope with the enrollment disaster. The future health of every college and university in the 1980s will depend on the course of action decided today."

JOHN A. BIELEC, assistant to the vice chancellor for administrative affairs, the University of Maryland, College Park

ENHANCED SCHEDULING, REDUCED COSTS

Measuring and benchmarking classroom scheduling is critical for optimum use of campus real estate. Central scheduling—which often means giving up department turf and renovating space to create the flexibility that corresponds to new learning techniques—is becoming more common.

Classroom use can be gauged by both hours scheduled and seats occupied. If improperly outfitted general access classrooms or teaching labs result in their being used only 5 to 10 hours per week, the utilization rate may range from 12 to 25 percent. Business leaders, particularly in for-profit institutions, would find such a low percentage of space devoted to primary mission unacceptable.

At the same time, no national standards define optimum room use or seat occupancy, and guidelines for space utilization vary throughout the nation, depending on institution, state, and region. Strong variations of mission and existing physical assets impede universal acceptance of particular guidelines.

That said, campuses can improve usage by understanding the space inventory; reviewing the *actual* hours, days, and times occupied; and analyzing the related data to formulate ways to improve.

- **A study in centralized scheduling.** The University of Arkansas, Fayetteville, has made great strides in centralized scheduling, classroom and lab modernization, and improved net utilization. Michael R. Johnson, associate vice chancellor for facilities, along with a dedicated campus team of administrators, faculty, and staff, implemented a number of plans to improve the university's space use.

The campus was in a growth mode in 2004, but it also needed to have a centralized scheduling process to ensure that all space was used effectively. By 2006, the calculations showed that the university had respective utilization rates of 40 percent for room use and 44 percent for seat occupancy for its nearly 16,000 students.

The campus disseminated classroom space utilization data to enlighten leadership and faculty on the advantages of improved scheduling. Taking time to bring each academic unit on board, the university achieved full implementation of the central process in 2011. By 2012, the campus had grown to an impressive 77 percent room utilization and 80 percent seat occupation, with an enrollment of 25,000 students. Johnson explains, "Critical is the communication and ownership development between all administration leaders and campus faculty to improve room use and avoid unnecessary new construction or major renovations to repurpose space."

- **Consider enrollment projections.** At the Georgia Institute of Technology, Atlanta, Howard Wertheimer, director of capital planning and space management, strives for "rational and practical guidelines to maximize the campus facilities assets." One strategy he promotes is to evaluate and rightsize the instruction space based on the registrar's office projected enrollment—regardless of historical precedent or geographic location. By taking a holistic approach to scheduling, administrators place classes to optimize the number of seats filled, thus using the campus to its maximum capacity.

Smaller institutions can also benefit from a close review of this data. At Central Lakes College, Brainerd, Minnesota, Kari Christiansen, vice president of administrative services, analyzed the weekly schedule data and discovered a disproportionate need for larger classrooms. She

planned an economical renovation of three 20-seat classrooms, converting them into two 48-seat classrooms. "In resource-challenged times, the campus has to be used to its fullest extent," she says. "By making multiple larger spaces, we were more efficient in both instructional delivery and facilities."

Although institution missions vary, practical and deliberate scheduling is a large component of space efficiency and sustainability.

METHODOLOGY MANAGEMENT

Global changes affecting higher education can also alter space use.

- **Models and modifications.** New education delivery models and related programming concepts, such as massive online open courses (MOOCs) and other online learning, can be as exasperating as they are opportunistic. Facilities must support the techniques, often to accommodate student schedules. However, despite the terms "distance" or "online" learning, components of their programming remain "on-ground" at the campus.

Students are often on campus, taking an online class for convenience between scheduled on-ground classes. And hybrid classes that include both online and on-campus components pose different scheduling problems. If several online classes meet, for example, at the campus for a two- to four-hour block of time during the same week of a semester, the campus may not be able to accommodate them all. In both of those situations, spaces with computer labs, or lounges with WiFi access, have had to be increased.

The campus at Rock Valley College, Rockford, Illinois, found significant schedule efficiency using hybrid classes that meet 50 percent of the time online and 50 percent in the classroom. Students in each of two classes use the same room at the same time, altering the two sections. In other words, two hybrid classes share a room on a Monday and Wednesday (or Tuesday/Thursday) schedule; one section meets face-to-face on Monday; the second section meets face-to-face on Wednesday. For another example of space designed for multiple delivery methods, see sidebar, "Combine the Benefits of Physical and Virtual."

- **Team players.** As the workplace becomes more collaborative, students must learn the skill of working in teams, a trend that increases the need for small conference or team rooms. According to David Moore, an architect of 21 major university master plans and projects, predominantly for libraries, these teaming rooms are highly sought after and no matter how many are built there seems to be a need for more. For example, at Clemson University, Clemson, South Carolina, his study called for an increase of 16 rooms for a total of 40 study rooms, and a similar number at Western Carolina University, Cullowhee, North Carolina. Public libraries are also moving in this direction. Moore says, "Many public libraries are asking for more of these spaces as well, to service small group activities by their patrons, including students working on group projects in the evenings and on the weekends."

Active learning spaces and classrooms that provide increased flexibility for today's learning styles can definitely cost more due to technology tools, flexible furnishings, and more square footage per student. Juggling the financial resources and downtime for construction, and additional equipment to update project team spaces, can add further complications to scheduling. Yet, one of the leading learning spaces advocates, Bob Beichner, director of the STEM education initiative at North Carolina State University, Raleigh, says, "These spaces, once built, are often used so intensely-used from morning until night-that the cost is highly justified."

The University of North Dakota, Grand Forks, recently completed a space utilization and planning study to learn details of classroom space efficiency and ways to improve use in light of increasing enrollment. General classroom utilization was at 86 percent, lecture rooms at 97 percent, and laboratories at 63 percent. While most room configurations support a traditional lecture environment, explains Peggy Lucke, associate vice president for finance and

operations, "We identified a handful for further analysis for potential furniture and technology updating to create several active learning spaces."

- **More-extreme measures.** Additional space savings can result from aggressive program development. Joseph E. Grasso, associate dean for finance, administration, and corporate relations at Cornell University, Ithaca, New York, and first chair of the NACUBO Sustainability Advisory Panel, comments that ultimate space savings could occur if universities developed full-year programs, with graduation in three years.

"The higher education sector is an asset-intensive sector with many high-quality buildings, and many of our colleges and universities only fully utilize their buildings eight or nine months of the year. With the price of education rising and the need to slow the growth of our physical, carbon, and cost footprints, we may be at the point where some colleges and universities should consider year-round academic programs and, possibly, to shorten time to degree within three calendar years."

Whatever your institution's space priorities, working on a master plan for facilities has numerous benefits. For the University of North Dakota, says Lucke, "The process of improving space utilization served to stimulate excellent discussion on how to improve overall academic delivery; the study will have a much greater impact than just improving space use."

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COMBINE THE BENEFITS OF PHYSICAL AND VIRTUAL

An observation some make about online education is that it lacks the intellectual and social interaction that many students seek in higher education. Yet, others note that delivering education online can be an effective model, with the added benefit of alleviating physical space shortages on campus.

While offering virtual learning does not necessarily require traditional classroom space, there are certainly ways to use facilities to enhance the online learning model. For example, although discussion boards and group-work technologies promote intellectual and social interaction online, interest remains in face-to-face encounters.

To meet this need for a combination of the virtual and physical, the College of Advancing and Professional Studies (CAPS) at the University of Massachusetts Boston (UMass Boston) is opening its first Learning Resource Center (LRC) in October.

Accentuating Positives

The center, located off-site in nearby Plymouth, Massachusetts, will serve several functions:

- **Provide physical space for students engaged in online learning.** Students will be able to register for online classes at the LRC with staff support and take their classes on site. A self-learning room, with seating for seven, will facilitate access to information resources, both printed and computerized. The space is equipped with a desktop computer, a laptop, and a large display screen.
- **Encourage collaboration in the center's five group-learning rooms.** Two rooms are set up as typical classrooms (one with a smart board); another has a computer station at each seat; one is equipped with an interactive iTV for two-way communication, projectors, and cameras; and one smaller learning room is set up in a boardroom style. Flexible furniture can be rearranged to suit all kinds of group- and cooperative-learning environments.
- **Offer a selection of online and face-to-face classes, both credit and noncredit.** Students will be able to access online courses, work with others in the class, and develop study groups.

Expanding on the Model

Despite the growth in online learning, many faculty and students are still hesitant to engage in new delivery models. In the report "Changing Course: Ten Years of Tracking Online Education in the United States," a collaborative study by the Babson Survey Research Group and the College Board, authors report that by 2012, 32 percent of college students were taking at least one course online—which means that 68 percent were not.

UMass leadership recognizes that many faculty and students remain unfamiliar with the technological advances in education delivery. To address this knowledge gap, CAPS has engaged its instructional design department to develop

courses for faculty, to introduce them to current online *teaching* technology; and for students, to introduce them to online *learning* technology.

The center's general aim is to ensure an environment where learners benefit from multiple resources, have opportunities for self-directed learning, and can reinforce research and exploration skills.

Costs and Benefits

Completed in August, the LRC will be officially introduced to the community via an open house in October. The preliminary goals are to provide both online and face-to-face academic and professional development opportunities to the local Plymouth community, primarily students and graduates of a community college that operates in the same facility. For students who do not want to travel, we plan to provide opportunities to complete majors online.

The LRC will provide registration, technical support, and a physical location for students to engage in online programming. We will increase awareness of the current online programming available to students and offer four or five additional face-to-face courses to enhance student transition to UMass Boston. Some classes may be offered under a dual-enrollment option with the community college. We hope to attract 20 to 50 students the first year.

Developing the center as part of an existing facility required approximately $60,000 of renovation. Another $2,400 for new signage; $17,000 for new furniture; and $10,000 for equipment, including a large-screen TV and video connections to the main campus, brought the total project costs to $89,400. Funded by the college's general operating budget, the LRC will operate with the existing personnel and will augment the professional development and enrichment classes already taking place at the facility.

Increased online and face-to-face course enrollments on-site and additional enrollments at UMass Boston will help to offset these expenses. The heightened role of UMass Boston in Plymouth will enhance the institution's reputation and provide needed educational services in the community.

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