Campus Learning Spaces:
Investing in How Students Learn

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Overview

To justify the substantial investment in bricks-and-mortar construction, colleges and universities must design and continually renew the physical spaces in which students learn. A variety of research studies document that today’s students learn differently than did many of the faculty now teaching them\(^1\) and that the design of learning spaces can favor or disadvantage various ways of learning.\(^2\) Campus planners are challenged to build flexible interior spaces so that buildings with 100-year life spans can continually adapt to new generations of learners and our new discoveries of how people learn.\(^3\) Without this capacity to modify the learning environment, institutions put themselves at a disadvantage in attracting and educating contemporary students.\(^4\)

New learning space design paradigms must adapt to student learning styles while still being mindful of the institution’s need for fiscal efficiencies. Previously, the cost savings associated with large lecture halls, fixed seating, and minimal investments in technology drove decision making. Today, the emphasis is more balanced, and the roles that attractive learning spaces play in bringing the most accomplished students and faculty to campus and in increasing student engagement with learning are better recognized.\(^5\) This research bulletin describes the active, visual, collaborative learning processes preferred by a growing percentage of the incoming student body as determined by the Felder-Soloman learning-styles inventory,\(^6\) and then provides strategies for designing classrooms, libraries, and informal learning spaces to respond to these demands.

Highlights of Learning Space Design for Contemporary Students

In 2001, Statistics 135 at The Ohio State University (OSU) enrolled approximately 3,250 students over four academic quarters, the majority of whom attended three lectures per week in a very large lecture hall along with biweekly lab sections led by a graduate student. With support from the Center for Academic Transformation, this course was redesigned based on a survey of student learning styles. Using the Felder-Soloman learning-styles inventory (1998), the student population was divided into those who preferred lecture, those who preferred small group discussion, and those who preferred independent on-line learning. By adapting teaching method to learning style, and delivering it in three different space configurations, student grades increased .5 standard deviations. Dropouts decreased from 20 percent to 12 percent, reported course satisfaction went up, and the per student cost fell from $190 to $142.\(^7\) While these savings and these improvements should be attributed primarily to the course redesign and new pedagogy, the flexible redeployment of space was essential to achieve these outcomes.

The Center for Academic Transformation study also showcased the importance of equipping traditional classroom space with presentation technologies—51 percent of the pilot population was predominantly visual, 42 percent indicated equal preferences for verbal and visual, while only 8 percent preferred verbal (traditional lecture) presentation.
of material. This preference is echoed by OSU faculty based on their choices of where to teach: utilization rates of technology-equipped classroom pool rooms averages 76.7 percent between the hours of 7:30 a.m. and 4:30 p.m. This compares to a utilization rate of 64.4 percent for those classrooms not equipped with projectors, Internet access, and presentation podiums in the room. Empty rooms contribute nothing to student learning and low utilization rates described as “excess capacity” weaken arguments for new construction that could more appropriately support student learning.

Figure 1. The Ohio State University Knowlton School of Architecture

A commitment to student-centered learning encourages us to think of a classroom or building as a place in which students and faculty spend their time and consider this time as a variable cost-per-hour of instruction. In a time-poor world, the precious commodity of formal learning space involves shared, scheduled time, and the true cost of that space is how effectively and efficiently the space provides access to learning resources. These resources include other students, access to information technologies and Web content, and flexible student and faculty space configurations that support efficient learning.
The OSU Knowlton School of Architecture illustrates the total cost of facilities construction/use. The Knowlton building opened in January of 2005 at a total project cost of $33 million or $202 per square foot (indexed to 2005). The assignable square footage cost is calculated at roughly $300 per square foot (loading all costs on usable, instructional spaces). A 520-square-foot classroom (26’ x 20’) accommodates one faculty member and 26 students following typical design guidelines. Valuing a faculty member’s time at $200/hour and each of 26 students time at a modest $6/hour, the cost of the time spent in the room ($356/hour) equals the construction cost allocated to the room ($156,000) in only 438 hours of use. If the classroom is occupied 34 hours per week, in 13 weeks the resource allocation of time exceeds the resource allocation of space. The economic lesson to be learned is that even with conservative valuations of faculty and students’ time, the variable costs of using that space rapidly exceed the fixed costs of building it.

We’ve demonstrated that the cost of building the space is much lower than the value of the time invested by the faculty and students while in the learning space. Regularly scheduled classes offer a recurring opportunity to accelerate the learning cycle, the process by which a student changes from consumer of information to producer of knowledge. Learning grows through a syncopated rhythm of interaction and argument, clarifying discussion and sometimes confusing next steps, presentation and critique, freezing and archiving, preservation and release. A guiding principle for the location of these conversations is that space should adapt to students and teachers, not students and teachers to space. To be effective, the faculty members who lead classroom learning need space that easily and quickly adapts to their teaching styles and the preferred learning styles of the students.

Because classroom space is shared, it should be rapidly reconfigurable to accommodate the needs of the learning community that occupies it in a particular hour. Having power and network connectivity handy and moving furniture to form student work groups should be as simple as a well-constructed theater set that changes between scenes. Most colleges and universities have 10 to 12 minutes between class periods, so this is the amount of time available to change actors, props, and staging. If space can’t be repurposed this quickly, the default set is what came before, and what came before is often one faculty member doing most of the talking facing a group of students. This usage pattern represents a misuse of sunk capital costs and the recurring costs of the value of the inhabitant’s time.

**Libraries**

Academic libraries are at a significant turning point with regard to space. The “Googlization” of print collections over the coming decade means that for the first time in their history, libraries may be able to contemplate a future without significantly adding more shelving space. It may take years to fully absorb the transformative nature of this change, but it will necessitate a rethinking of library space. It may now be possible to consider transitioning libraries from being primarily for the storage of books to primarily supporting learning.
The great reading rooms of our academic libraries will continue to provide quiet learning and discovery spaces but reduced pressure on shelving should free space in key central locations to support collaborative spaces appropriate to the active learning styles necessary for class teams and study groups. In fact, both approaches will be critically important. Variety of environment types is a key element in user satisfaction.

The University of Michigan’s Duderstadt Center\textsuperscript{11} is a 24 x 7 facility that is home to both the largest computing center and one of the larger libraries on campus. User studies\textsuperscript{12} indicate of the approximately 10,000 students who use the building, 53\% use it daily. Nearly half of those stay between 2 and 6 hours, and an additional 22\% stay more than 6 hours. Access to food, coffee, and comfortable seating has done much to support an active learning environment. Survey comments cite access to computers and library resources as two of the most compelling reasons to use the Duderstadt Center, but two of the most important things desired were more computers and designated quiet zones.

As libraries begin to consider transforming space, it might be tempting to build more traditional group study rooms with fixed walls. This, however, once again averages the investment in facilities rather than maximizing the investment in space. Open office systems and movable walls with easy access to whiteboards, presentation technology, power, and wireless networking should do better over time at adapting to changing technology and learning styles with less investment and more opportunities for innovation for both groups and individuals.

\textbf{Informal Learning Spaces}

The concept of informal learning has been developed most completely in the literature of lifelong learning and organizational effectiveness. Informal learning—observing others, asking for clarification during the act of doing, ad hoc group discussion and debate—is credited as the context for 70 to 80\% of knowledge acquired and valued by adult workers.\textsuperscript{13} Rather than take this as an affront to higher education’s efforts in formal education, we should apply the learning that takes place in informal places to the classroom and library. Informal learning spaces support chance encounter, divergent conversations, and reflection and study about content presented in formal settings. We can extend the value of our investments in both formal and informal learning spaces by encouraging our students to linger, meet, and talk informally out of class.
These informal spaces are the pathways, gathering spots, and points of dispersal among our formal learning spaces. Their job is to make the campus “sticky,” to support chance encounters of value and social exchange. Occupied space serves the purpose for which it was constructed, reduces the need to build more space, and muffles the legislature’s anger at the echo in an empty hall. Every aspect of learning space that invites both community and students to linger, learn, and be involved beyond the classroom core hours of 7:30 a.m. to 4:30 p.m. is positive use of space. The longer the lingering and the more use of space per day, the faster the payback for well-designed learning spaces.

Holeton describes building informal, social learning spaces with the help of student surveys and focus groups at Stanford University. He reports student requirements for informal learning spaces include flexibility, comfortable and ergonomic seating, “noise zones,” food and drink, and pervasive technology. These space characteristics can be found in Starbucks and Borders bookstores, validating these survey findings about what makes space attractive for informal learning. The space is communal, furniture is comfortable, lighting is good, there are often community-based media (large-screen displays), and access to learning resources (wireless networks, books, newspapers, and magazines). Food and beverages are available and through “social magic,” numerous groups form, function, learn, laugh, and disband in short or extended periods of time.
There is a downside to lingering, which requires vigilance on the part of the designers. In addition to being flexible and welcoming, learning spaces need to be safe and designed with ergonomic considerations in mind. Good lighting, reasonable acoustics, space that lets students move around and change their orientation to each other and to displays, are considered to be staples of informal learning spaces. Students and faculty are spending so much time with computers that their health can be put at risk. The main recommendation from ergonomic science is to permit change—change in posture, change in eye focus distance, and opportunities to get up and move around. Mobility brings new concerns as well as opportunities.\textsuperscript{15}

**What It Means to Higher Education**

Project Kaleidoscope emphasizes the importance of physical space:

The most important impact for institutions is found in enrollment trends—not only rising numbers of majors, but also improvement in their retention; the number of students from other departments enrolling in science courses as electives; the degree to which programs attract and retain greater numbers of women and minorities. Corollary measures include increases in research involvement and output, for students as well as faculty; and post-graduate outcomes in graduate/professional school acceptances and job placements. Good scientific research also attracts greater numbers of external grants, and gifts to the sciences in general can also be expected to increase as reputations are enhanced by commodious spaces.\textsuperscript{16}

To deliver the benefits suggested above, the following actions are recommended for higher education institutions.

- **Build and furnish space as a response to the call for accountability.** This results in better space utilization, more learning, and more engaged and satisfied students.

- **Invest for the long term.** Buildings with 100-year life spans will educate five generations of students. New generations of students will make new demands. Pervasive learning supported to meet the demands of time-constrained constituencies should be a long-term goal.

- **Commit to 24 x 7 learning.** Learning is an ongoing process that occurs across dedicated and multipurpose public and private spaces. The characteristics of these spaces—flexibility, support for access to external resources and social groups, stickiness and safety—are the hallmarks of holistic space planning at universities.

Mobility is king, and it increases the importance of the physical space in which technology is used. Mobile technologies, mobile students, and simultaneous presentations must be supported in the learning space. Seating and sight-line configurations should encourage collaborative work. Power, acoustics, and illumination...
issues are different in the context of mobility. Campus safety is a concern at all colleges and universities. Activity rather than isolation increases student security. Well-designed space invites activity.

Colleges and universities have begun the transition from teaching to learning organizations. While these changes can be seen as a response to the increased pressures of competitiveness and accountability, it is also accurate to see them as an evolutionary adaptation to the active learning styles of today’s students and the opportunities created by pervasive, inexpensive, and highly mobile information technologies.

The reconceptualization of the campus as a series of diverse learning spaces allows for a renewed celebration and rededication of institutional landmarks such as the central library, student union, and residences. The massive digitization of research library collections\(^{17}\) permits a rethinking of centrally located library space for the purpose of co-locating information resources and technologies with space for research support services and informal learning spaces. The emerging challenge in libraries will not be access to information as much as being able to intelligently navigate it and use it.

Pressure to modernize residences, recreation centers, and student unions offer the prospect of integrating informal collaboratories with group and individual study spaces. Students expect to do their work where they are rather than traveling to a dedicated location. Wireless networks and mobile technology increasingly support this expectation. This generation of time-constrained students is comfortable multitasking\(^{18}\) and sees nothing unusual about going online to check class notes between other commitments.

New and renovated facilities can have a positive impact on the recruitment and retention of students and faculty.\(^{19}\) Spaces that adapt to the changing needs of scholars will not only support learning but will build community. Coffee shops in high-traffic classroom buildings or libraries can do far more to encourage faculty–student interaction than an increase in office hours. The more engaged students are in their learning activities, the more satisfaction they will express about their school and program of study.

The introduction of learning space into facility design must be done with maximum flexibility, and the adaptation of space must be considered for the long term. Technology change and the evolution of its use by scholars will be constant. Changes to space, usually thought of in terms of decades, if done with flexibility will permit evolutionary changes. Space can be rearranged to adapt to a project team or impromptu seminar. It is far easier to replace furniture or upgrade equipment than to build or demolish walls.

Adjusting to evolving technology and learning styles requires the building and monitoring of experimental learning spaces. Ongoing assessment, including focus-group tracking and usability studies, require staff assigned for the purpose. Identifying and applying student learning preferences will facilitate the adaptation process and represents an investment in the institution’s future. See Ohio State’s Digital Union for one example of such a facility.\(^{20}\)
Investing in the development of learning spaces allows better space utilization, better responsiveness to the changing needs of students and faculty, the more cost-effective application of academic technologies and resources, and higher levels of student satisfaction.

Questions to Ask

- What evaluation models does your institution use to balance the cost issues of efficient space design with the benefits of effective space design—more learning, enhanced reputation, and greater revenue generation? Can you list three physical spaces on your campus that are vibrant, adaptable, and welcoming? Can you identify three classrooms or buildings that express confinement, tension, and inhospitality?

- Are you a 24 x 7 institution with respect to your physical space? Are “other spaces”—cafes, lounges, hallways—furnished, lit, and equipped with the technical infrastructure needed to allow them to perform as extended, informal learning spaces? Are the learning opportunities (chance conversation, remote resource access, stickiness) of informal learning spaces explicitly defined in your space planning?

- Has space been designed with flexibility in mind? Can faculty and students reconfigure their learning environment to meet different teaching and learning strategies within the time allocated for changing classes? Can just-in-time learning occur during the class through access to Internet resources?

- Do collaborative learning and independent scholarship comfortably coexist on your campus? Is the library zoned for group work and informal learning? Can “silent scholarship” survive the “cacophony of collaboration”?

- Space considerations are broad-based and require many viewpoints to plan well. Are ergonomists, learning theorists, students, students with special needs, architects, librarians, facilities managers, keepers of the institutional data, faculty members, and fiscal agents all involved in designing learning spaces?

- Do you have a communication plan that explains your learning space design investments to faculty, students, staff, alumni, and the public? Does it describe and justify learning benefits to the students, faculty, and community users, or does your publicity highlight the costs and grandeur of new facilities?

Where to Learn More


Society of College and University Planners (SCUP), <http://www.scup.org/>.


Endnotes


11. See the James and Anne Duderstadt Center at the University of Michigan, <http://www.dc.umich.edu/>.


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