NLII National Learning Infrastructure Initiative

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Leading the Transition from Classrooms to Learning Spaces

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One of the most important activities of a college or university is enabling student learning. Historically, the place where faculty and students came together for formal learning was in the classroom. However, the Internet has changed notions of place, time, and space. Space is no longer just physical; it incorporates the virtual. New methods of teaching and learning, based on an improved understanding of cognition, have emerged, as well. As a result, the notion of a classroom has expanded and evolved; the space need no longer be defined by "the class" but by "learning." Learning space design has emerged as an important consideration for colleges and universities.

Responsibility for classrooms and learning spaces rests with different audiences in different institutions. In many, the provost leads the space discussions. Oftentimes space is determined by a committee representing academic affairs, research, and facilities. Irrespective of the composition of the leadership team, designing space is an important institutional activity. Although committees may change every year or two, facilities last for decades. This paper is intended for as a primer for institutional leaders, specifically, provosts, architects, and space planners, who have direct or indirect responsibility for learning spaces.

IMPORTANCE

Learning spaces convey an image of the institution's philosophy about teaching and learning. A standard lecture hall, with immovable chairs all facing the lectern, may represent a philosophy of "pouring content into students' heads." An active, collaborative teaching and learning philosophy is often manifested in a different design. Space can either enable—or inhibit—different styles of teaching as well as learning.

A number of studies have linked learning spaces and course design with student achievement, mastery, and retention. For example, in SCALE-UP, the student-centered activities for large enrollment undergraduate program, student ability to solve problems was improved, conceptual understanding increased, and attitudes improved. Failure rates were reduced by nearly three times compared to a traditional section of physics.[1]

The building and renovation of learning spaces represents a large capital investment for campuses. Estimates are that $50 billion will be spent on higher education physical facilities over the next few years. Not only are learning spaces a large capital investment, but the technology and personnel costs of designing and maintaining them are significant. The longevity of these spaces should be noted. A building (and its learning spaces) is designed to last 50 to 100 years; the curriculum and courses that are taught in those spaces may change every 10 years, and the technology may change every year. Clearly, the stakes are too high to risk settling for an inadequate design.

The purpose of this paper is to help higher education leaders better understand the decisions associated with learning space design. Learning, rather than heating systems, lighting controls, or computer projectors, should be at the center of learning space design. For the purposes of this paper, learning spaces are defined as regularly scheduled, physical locations designed for face-to-face meetings of instructors and students (for example, lecture halls, seminar/discussion rooms, laboratories, studios).[2]

VISION

Before designing a learning space, it is important to have a vision of the space. Setting the vision is the responsibility of the leadership team. The vision for a learning space derives from the underlying learning philosophy of the institution and its programs. Among the questions institutional leaders may ask are:

- What will the student experience be like? Is the focus on learning or covering content?
- How is information technology used in the service of student learning? Does it make it more problem-centered? Collaborative? Personalized?
- How does the learning space fit in the institution's strategic plan? How does it integrate with the library?
- Can the space be used for nonclass uses?

A focus on learning. At the turn of the century "basic literacy skills included reading, writing and calculation. Knowing was being able to remember and repeat. Today, knowing includes critical thought, persuasive expression, and the solution of complex problems. It also means utilizing a well-organized set of facts to find new information and use it to solve novel problems."[3]

Learning research indicates that competence is developed in active, exploratory, and social settings. When participants are asked to think conceptually and critically, involving both peers and experts, learning is enriched. This learning research has implications for space design. If learning is active and knowledge is constructed, then classrooms may need to be designed differently than they were in 1900. For example, does this constructivist approach call for flexible seating arrangements so students can work in groups, engage in debate, or have face-to-face discussions?[4]

Learner-centered principle:
Learning is social

Learning that is social requires feedback and interaction among participants. Does your learning space enable learners to:

- Get to know each other and engage in dialogue?
- Work on group projects?
- Interact in a variety of ways such as collaborative or cooperative learning?
- Present their work publicly, teach others, or give feedback?

The interactive campus. The trend toward active and collaborative learning is based on learning theory and research as well as a growing understanding of the current generation of learners. It is also enabled by IT. Irrespective of age, virtually all today's learners use the Web extensively for information, communication, collaboration, and socializing. Students expect to interact with information and receive near-instantaneous responses. Rather than telling students about a topic, engaging them in active learning and collaboration typically results in greater mastery and transferability. Using digital archives, databases, and the tools of a profession allows students to engage in "first-person" learning. Rather than being told the conclusions, students build their own understanding. Implications for first-person learning spaces may range from project-rooms to network access during class to polling devices.

William J. Mitchell asserts that the forms and functions of learning spaces are changing rapidly as we discover new ways to take advantage of computer and communication technologies. New types of learning spaces not only incorporate technology, they also create new patterns of social and intellectual interaction. Taken altogether these trends suggest new strategies for overall campus design. In essence, the entire campus becomes an interactive learning device.[5]

Learner-centered principle:
Active learning

Active learning involves real world problems through which learners practice and receive feedback from peers and experts. Do your learning spaces enable learners to:

- Work together to address real-world problems which may require data collection and analysis?
- Interact with people and information from outside the classroom?
- Debate, research, inquire, and solve problems?
- Engage in simulations, virtual field trips, role playing?

Although all visions may not be as bold as Mitchell's, a vision should underlie learning space design. Once a vision is established, clearly communicating it to the diverse constituencies involved with learning spaces follows. Communicating the vision once may not be enough; as different individuals become involved over time, the vision must be revisited. If all parties clearly understand the vision, it will be easier to make decisions throughout the process.

ANALYSIS

Before beginning the design of a learning space, several types of analysis and information gathering are recommended. These range from an inventory of existing space to considering curricular reform.

Disciplinary needs. Although many learning activities are generic, others are closely tied to the discipline. The design of learning spaces for physics, for example, may be different from space for history or fine arts. The need for laboratories, studio spaces, or project rooms is often tied to specific disciplinary needs, and occasionally, to accreditation criteria. Although it would be ideal to design learning spaces for a single discipline, most often spaces must accommodate a range of programs. In some cases there is an explicit need to integrate different disciplines, such as in multidisciplinary programs.

External benchmarking. Looking outside the institution to other colleges and universities, or even business settings, will provide ideas about learning space. Visiting and experiencing other spaces, first hand, is a useful step in the design process.

When considering exemplary space, ask:

- What was the vision that led to the design of a particular space?
- What lessons has the institution learned?
- Would the space fit your culture, budget, and student population?

Learning modes. If space is to promote learning, it is critical to know the learning activities that should occur. Those activities will determine specific requirements such as whether project space is needed or student laboratories are required. In a learning activity analysis both the learning activity and the

associated physical/spatial needs should be described. MIT's aerospace engineering program defined learning modes based on four attributes:

- Size (large versus small project)
- Length of time (class session versus semester-long)
- Space type (dedicated versus flexible)
- Interaction (individual versus group)

For example, in the aerospace program, a design project mode is a large-scale project lasting the full semester. It necessitates dedicated space, is design-intensive, and requires a close connection to professionals outside the institution.

Existing space use. Before designing new space (or renovating space), consider studying how space is currently used. An audit of centrally or departmentally scheduled classrooms provides only part of the answer. Where does learning take place on campus? Do students use classrooms outside of class time? Is learning taking place in small groups in the library or a coffee shop? At what hours is space used? In one MIT department where key cards allow 24-hour access to space, room usage between 5:00 p.m. and 11:00 p.m. was nearly as high as during the daytime (32% versus 44%); between 11:00 p.m. and 9:00 a.m. space was used a surprising 25% of the time. Understanding existing space use may provide important insights into designing new or renovated space.

Gap analysis. Once current and desired space uses are understood it is possible to develop a gap analysis. Such an analysis may go beyond number of seats, centrally scheduled hours, or repair and renovation funds. It may include issues such as the gap between existing and emerging pedagogies. Current classrooms may embody a pedagogy of covering content. Emerging pedagogies may embody exploration, experience, and collaboration.

Curricular reform. Curricular reform often stimulates a reconsideration of space. As programs transition to more active, collaborative, or project-based learning, their space needs shift from those based on a lecture pedagogy. Multidisciplinary activities may necessitate space redesign, allowing disciplines to co-locate, as well.

THE TEAM

Learning space design requires a broad-ranging team. Although the composition of the team may vary at different points in the design process, it is important to ensure the learning vision and design principles are consistently represented. The provost may have a particularly important role to play by ensuring that learning is the primary driver of the many choices that must be made throughout the design process.

Many design teams are comprised of a disciplinary advocate (dean, department chair, faculty leader), facilities designer, architect, planner, project manager, and contractors. Aligning the diverse perspectives of these constituencies can be a challenge. As a result, it is important to ensure that all have a clear understanding of the learning vision and design principles.

Who should be "at the table"?

- ☐ Administration
- ☐ Faculty
- ☐ Students (undergraduate, graduate)
- ☐ Facilities
- ☐ Planning
- ☐ Information technology
- ☐ Library
- ☐ Teaching and learning support

In the initial stages of a design project it may be important to involve students. At other stages, consulting maintenance workers may have merit. Irrespective of the composition of the team, maintaining communication is critical.

DESIGN CONSIDERATIONS

A number of principles, considerations, and constraints can impact learning space design. Maintaining a balance among these factors, while keeping learning as the primary objective, is a critical role for institutional leaders.

When designing learning spaces, have you taken into account:

- The institution's strategic plan?
- Disciplinary needs and curricular changes?
- Projections for growth in student numbers?
- The institution's technology plan?
- Potential pedagogical innovations?

Design learning spaces around people. Learning is an active, collaborative, and social process that hinges on people. Although classrooms have been designed around technology in the past, mobile devices, wireless access, and emerging technologies make it possible for the technology to move into the background rather than being the focus of design. Learning spaces should enable—not inhibit—teaching and learning. If the space and its technology are too complicated they can inhibit rather than enable learning. Ideal learning spaces encourage interactions among students as well as with faculty. Implications range from improved sight lines to the ability to work in small groups.

Support multiple types of learning activities. Learning spaces should be designed to support multiple modes of learning (discussion, experiential learning, reflection, and so on). Few spaces are used for a single type of class, hence the need to support multiple modes. Because active, collaborative learning is important, space should support authentic, project-based activities. In addition, space may support informal learning, such as using the walls to post current research or artifacts from previous discoveries. Spaces adjacent to classrooms, such as hallways, may be used for informal gatherings. Some institutions have put blackboards in hallways to create "think stops" where students can gather to brainstorm and share ideas.

Enable connections, inside and outside. To facilitate communication, collaboration, and engagement, space should make both face-to-face and online discussion possible, within as well as beyond the classroom. For those students who might be reticent to participate, it is important that space be designed so there is "no back of the room," avoiding the "lecture hall" feeling. In some cases it may be important to integrate other groups, such as the library or external experts, either through co-location or IT.

Make space flexible. Studying how students use learning spaces often reveals that space is used for class as well as for informal group meetings, studying, or even non-curricular activities (for example, club meetings). Spaces are also used by faculty from different disciplines who teach in different ways. It is infeasible to have dedicated space for each class, so as much as possible learning spaces should be flexible so they can be reconfigured for different classes within a relatively short period of time (for example, in between class periods).

Accommodate information technology. In many, although not all, cases learning spaces should accommodate information technology. Wireless access is growing on

campuses. Students oftentimes bring laptops, PDAs, or other electronic devices into learning spaces. Faculty increasingly use the Web, streaming media, and simulations as part of the learning experience. Integrating the physical with the virtual provides additional options for faculty and learners alike.

Design for comfort, safety, and functionality. For learning to occur, occupants of space should be comfortable. For students this may mean providing adequate space for laptops and elbows. A broad definition of functionality should also be considered; beyond holding class, space for storage may be important (for example, backpacks and coats for students or supplies for faculty). Accessibility for students with disabilities is another consideration. In addition, spaces should be designed with security in mind, both physical security as well as network security.

Reflect institutional values. Physical space signifies much about an institution. While most institutions consider themselves student-centered, the space may be teaching-centered. Colleges and universities that believe in collaborative learning are likely to have team-rooms and informal gathering places. Institutions that emphasize undergraduate research as a part of the student experience may have space that supports such research experiences. Space can enable or inhibit a student-centered approach to learning.

POLICIES

Although policies may not immediately come to mind when designing learning spaces, they should be considered. Accessibility is a critical issue; all learning spaces, physical and virtual, should be designed to enable access by persons with disabilities. Nationally, approximately 10% of college and university students have some form of disability.[6]

If computers and Internet access are allowed in learning spaces, acceptable use policies should be explained and adhered to. For example, in situations where the computer monitors are visible to other students, there is the potential that students may be exposed to “offensive” materials (hate sites, pornographic content, and so forth).

ASSESSMENT

Applied to learning space design, assessment represents the structured study of the effectiveness of new or redesigned learning environments. The goal is to identify problems and implement needed changes. Ongoing assessment of learning spaces results in iterative design and continuous improvement. In fact, some institutions have found it beneficial to create prototypical spaces. At Stanford University, for example, faculty are allowed to use a space over three semesters to experiment, develop, and solidify how they wanted to use the space.

Such assessment may include the observation of students and faculty in the space, interviews, or focus groups. For example, consider studying student patterns of room use over time or asking students to rate the overall impact of space on their learning.

Important questions to ask include whether the facility contributes to:

- Improvements in teaching and student learning, pedagogy, and course structures
- Greater interaction among students and faculty
- A cohesive campus community[7]

CONCLUSION

A number of factors are prompting higher education's interest in learning spaces: the need to renovate existing space or accommodate additional students, pedagogical advances, a better understanding of learners, and in some cases, curricular reform. Moving from classrooms to learning spaces involves a conceptual shift as well as a commitment to putting learning ahead of technology.

Institutional leaders have an important responsibility to keep the focus on learning as design teams move from vision to implementation. Developing the best learning space design hinges on an analysis of needs, learning modes, and existing space use. Design considerations go well beyond heating, lighting, and A/V controls. Among the most important design considerations are:

- Reflecting institutional values
- Designing space around people and multiple types of learning activities
- Enabling connections; accommodating information technology
- Making spaces flexible, comfortable, secure, and functional

Good learning space design can support each institution's mission of enabling student learning. In fact, the convergence of technology, pedagogy, and space can lead to exciting new models of campus interaction.

RESOURCES

- "Learning Space Design in the 21st Century," NLII 2004 Fall Focus Session; see the proceedings at <http://www.educause.edu/2004FallFocusSession/2672>.

- Malcolm B. Brown and Joan K. Lippincott, "Learning Spaces: More than Meets the Eye," *EDUCAUSE Quarterly*, Vol. 26, No. 1, 2003, pp. 14–16, <http://www.educause.edu/ir/library/pdf/eqm0312.pdf>.

- Nancy Van Note Chism and Deborah J. Bickford, eds., *New Directions for Teaching and Learning: The Importance of Physical Space in Creating Supportive Learning Environments, No. 92* (San Francisco: Jossey-Bass, 2002).

- Project Kaleidoscope, "Focusing on Facilities," <http://lists.pkal.org/facility/index.html> .The main page links to many documents focusing on the design of undergraduate math and science facilities.

- Lennie Scott-Webber, *In Sync: Environmental Behavior Research and the Design of Learning Spaces* (Ann Arbor, Mich.: SCUP, 2004), <http://www.scup.org/pubs/books/is_ebrdls.html>.

[1]Robert J. Beicher and Jeffrey M. Saul, "Introduction to the SCALE-UP (Student-Centered Activities for Large Enrollment Undergraduate Programs) Project," North Carolina State University, <http://www.ncsu.edu/per/Articles/Varenna_SCALEUP_Paper.pdf>.

[2] Informal learning spaces (for example, atriums, residence halls, student lounges) can be important spaces for learning but are not specifically addressed in this paper.

[3] Malcolm Brown, "Introduction to Learning Spaces," personal communication, e-mail, 2004.

[4] Ibid.

[5] William J. Mitchell, "Rethinking Campus and Classroom Design," presentation at the NLII 2004 Fall Focus Session, September 9, 2004, Cambridge, Mass, <http://www.educause.edu/librarydetailpage/666&id=nli0438>.

[6] National Center for Educational Statistics, 2003.

[7] *What Difference Do Improved Facilities Make?* Project Kaleidoscope, October 1998, <http://lists.pkal.org/pubs/cov/>.

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<http://www.educause.edu/LibraryDetailPage/666&ID=NLI0447>.