spaces that work

	Project	Institution	Architect
1	The Edward St. John Learning and Teaching Center	University of Maryland, College Park	Ayers Saint Gross
2	Da Vinci Center for Innovation	Virginia Commonwealth University	BCWH
3	Faculty Workplace Evolution	MnState (formerly Minnesota State Colleges & Universities)	Bentz/Thompson/Rietow
4	Learning Innovation Center (LInC)	Oregon State University	Bora Architects
5	LaGuardia Maker Spaces	New York University	brightspot strategy
6	The Engineering Building Oval	North Carolina State University	Clark Nexsen
7	Life Sciences Building	Loyola Marymount University	CO Architects
8	Active Learning Classroom (ALC)	University of California, Santa Cruz	ehdd
9	New Engineering Hall	Rowan University	Ellenzweig
10	Academic Innovation Center	Bryant University	EYP Architecture & Engineering
11	Centennial Centre for Interdisciplinary Science	University of Alberta	Flad Architects
12	Firestone Library Renovation	Princeton University	Frederick Fisher and Partners (FFP)
13	School of Business, Capital Federal Hall	University of Kansas	Gensler
14	Missouri Innovation Campus	A collaboration between University of Central Missouri, Lees Summit School District, Metropolitan Community Colleges, and regional business partners	Gould Evans
15	Renovation and Expansion of STEM Facilities	Rhodes College	Hanbury
16	Collaborative Biological Teaching Lab Center	Northwestern University	Harley Ellis Deveraux
17	New Core Sciences Facility	Memorial University of Newfoundland	HOK
18	Wentz Science Center	North Central College	Holabird and Root Architects
19	Interactive Studio Classroom	Boston University	ICON Architecture, Inc.
20	Engineered Biosystems Building	Georgia Institute of Technology	Lake|Flato Architects
21	Gross Hall for Interdisciplinary Innovation	Duke University	Lord Aeck Sargent

22	School of Education	Winona State University	LEO A DALY
23	Odegaard Undergraduate Library	University of Washington	Miller Hull
24	Academic Science Center	University of Kentucky	Payette
25	Watt Family Innovation Center	Clemson University	Perkins+Will
26	Gehl-Mulva Science Center	St. Norbert College	Research Facilities Design
27	E. Craig Wall Jr. Academic Building	Davidson College	Shepley Bulfinch
28	Engineering Student Achievement Center	Auburn University	SmithGroupJJR
29	The New School University Center	The New School University	Skidmore, Owings & Merrill LLP
30	Eugene D. Schermer Instructional Building	Grays Harbor College	SRG Partnership
31	Straz Center Modernization & Expansion	Carthage College	Stantec
32	Digital Classroom Building	Washington State University	Vantage Technology Consulting Group
33	Rollins Campus Center & Library	Young Harris College	VMDO Architects
34	Engineering Product Innovation Center (EPIC)	Boston University	Wilson Architects
35	Nanoengineering & Sciences Building + Molecular Engineering and Sciences Building	University of Washington	ZGF Architects LLP

THE EDWARD ST. JOHN LEARNING AND TEACHING CENTER

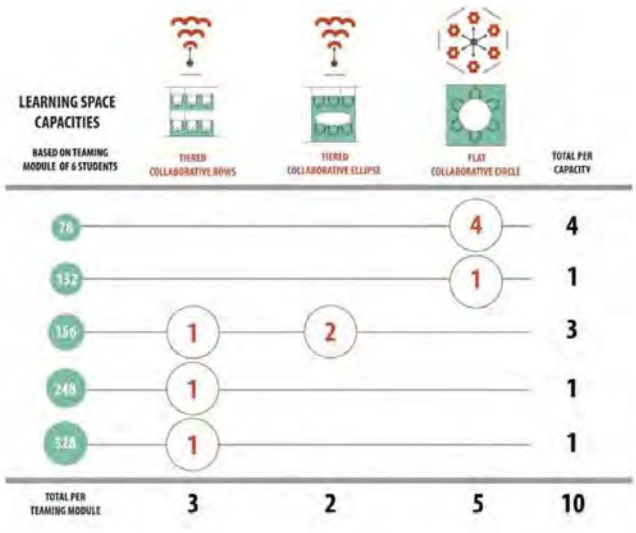
University of Maryland, College Park

Ayers Saint Gross

spaces that work

KEY QUESTIONS

- How can what we know about the success or failure of existing learning spaces be incorporated into our planning and improve the design of learning spaces into the future?
- How can our students become active participants in our planning and constructively contribute to the design of the spaces in which they will learn?
- What do we know about different learning styles? What might be the appropriate balance and blend of learning modes in the spaces we are planning? What do we know about how content can be delivered and explored to optimize the learning of diverse groups of students?
- What affordances in these learning spaces—including technologies—allow students to gain an intensified awareness of how diversity and culture influence their experiences as learners?
- How do we think about the factor of "time," about how there will be the highest utilization of spaces inside and outside of normal classroom hours in unique ways? How do we incorporate this thinking more effectively into learning space design?
- How do the spaces for learning in this important new facility—and the facility itself—contribute to the University's goals of achieving sustainability (reduced energy use) and teaching resourcefulness?



The design concept followed three tenets:

- Instructional spaces must be developed beginning with the needs of the student;
- Learning happens everywhere, both inside and outside of the classroom;
- Openness and transparency would be achieved in one continuous connected space, or agora, under one roof.

About a third of all undergraduate students will attend classes in the building every day, and the facilities are designed to support up to 2,000 students occupying classrooms at any given time.

Formal learning environments are designed to accommodate: collaborative learning in teaming modules of six; multi-curricular content delivery; a diverse range of pedagogical approaches; problem-based learning as a portion of every class; technology for traditional teaching methods as well as distance/blended learning; furniture that is mobile, durable, and flexible, with a variety of heights, surfaces, and amenities.

Informal learning environments are designed to accommodate: collaborative teaming sessions (in acoustically designed spaces); spontaneous faculty-to-student and peer-to-peer dialogue (in open nooks or furniture alcoves)

Instructional support space incudes: high-fidelity recording to capture lectures for blended learning courses; support staff offices for the Center for Transformative Learning.

RESOURCES & MORE

- https://tltc.umd.edu/esj
- http://asg-architects.com/
- http://pkallsc.org/events/2016-roundtable-university-washington

DA VINCI CENTER FOR INNOVATION

Virginia Commonwealth University

BCWH

spaces that work

KEY QUESTIONS

- A T-shaped individual is someone deeply anchored in a discipline with the capacity and openness to engage across disciplines. How can spaces for learning ensure that students become T-shaped individuals by the time they graduate and move into the world?
- Current trends in higher education value a culture of openness and sharing in the academic environment. How can our planning and our spaces promote strategic partnering between students of different backgrounds and disciplinary interests? Can this happen if we push the boundaries of learning beyond the formal classroom?
- Can an architectural "identity" help champion a new program; can a space catalyze new ideas, programs, and curricula? That is to ask, if we build these spaces will they come?
- Can our current and future academic needs fit neatly within yesterday's architectural bones?
- How can a building itself become an "intrapreneur," that is, encourage risk-taking and innovative thinking among those using the building?

Before the opening of the Da Vinci Center, affectionately known as "807" by students in reference to its address, the Center had comprised a small certificate program with a few classrooms and a lab in the engineering building and offices in the neighboring business school. The goal of the project was to allow the Center to have a public face and serve as a 24-hour design incubator.

The Center wanted to become a flexible, open think-tank where students could gather in teams to discuss and create, using whiteboards, laptops, hand models, and 3-d machinery to fabricate projects for real-world clients. The designers worked closely with Center faculty to accomplish these goals and set the creative undertone for student work in the space.

The end result was not only the addition of 3,800 square feet for the program, but a tale of process innovation: the new space has fostered curriculum development, allowed for strategic partnering between students from different disciplines, and increased the potential for learning on campus without expanding the campus footprint. The building itself has become an "intrapreneur" for the students in the various programs by encouraging risk taking and innovative thinking.

Through a participatory design process, faculty in the Da Vinci Center and architects from BCWH worked to ensure that the renovation was responsive to and appropriate for students' needs—cultural, emotional, spiritual and practical.

RESOURCES & MORE

- http://www.davincicenter.vcu.edu/
- http://bcwh.com/
- http://pkallsc.org/events/2016-roundtable-georgia-institute-technology

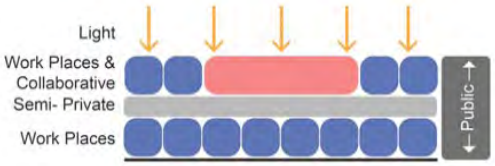
FACULTY WORKPLACE EVOLUTION

MnState (formerly Minnesota State Colleges & Universities)

Bentz/Thompson/Rietow

KEY QUESTIONS

- How can the faculty workplace environment support and adapt to ongoing cultural and pedagogical changes?
- How can we address contrasting programmatic needs for private-focused faculty work with interactions with students as individuals and in groups, or with other faculty, particularly with limited physical space and financial resources?
- In thinking about the faculty workplace environment, what parallels can be drawn from research with corporate open-office environments?
- What is different about the academic context that corporate research may not address?
- Are there universal issues in addressing these questions, or do differences in institution type, size, context, etc. have an impact on how we address these questions during the planning process?
- What do we know, and what do we need to know, about how student learning outcomes are affected by access to faculty outside the classroom setting?



RESOURCES & MORE

- http://www.minnstate.edu/
- http://www.btr-architects.com/

NEW FACULTY-STUDENT COLLABORATION SPACES

Our higher education partners are under pressure to exhibit better student outcomes even as they increase space utilization, reduce costs, and facilitate the success of faculty and student teaching and learning activities. We worked with faculty and staff to examine the spectrum of work activities they perform daily, by semester, and over the school year and the workspaces they use now. One size does not fit all and one size does not fit even one all the time.

Working in collaboration with faculty, administrative and student stakeholders at two campuses, the goal for the new faculty office suites was to create cross-disciplinary cooperative areas (dubbed "Learning Co-ops") to foster and sustain opportunities for student-faculty and faculty-faculty interactions, both intentional and serendipitous. Some concepts are being tested:

- Zoning of spaces from public, collaborative and active to private, focused, and quiet (diagrams below, below left and top).
- Varying the proportion of private offices/shared offices/open and unassigned offices.
- Varying the degrees of transparency and visibility.
- Devising learning co-ops with multiple disciplines, co-locating departments and student resources. Permeable borders among departments allow for change over time.
- Providing a variety of fixed permanent partitions and demountable partitions to maximize the adaptability for future change with minimal construction.

LEARNING INNOVATION CENTER (LINC)

Oregon State University

Bora Architects

spaces that work

- How can classroom environments improve the retention of both students and faculty and increase graduation rates?
- What are the spatial characteristics that encourage active learning, and are they scalable? Can they be applied to lecture halls? Could lecture halls be more than a necessary program element, becoming an experience that faculty aspire to and students are attracted to?
- Is the classroom building replacing the recreation center as a primary recruiting tool? What is motivating institutional investment in effective teaching and learning space, and how does a project fuel that investment? What is the impact of housing a significant percentage of campus classroom seats under one roof?
- How do we know whether new spaces for active learning are improving learning outcomes?
- How do we inspire faculty to consider new teaching methods and spaces, and equip them with the skills, confidence, and excitement needed to embrace "experimental" teaching environments? What programming and design processes effectively maximize this consideration?
- How do we leverage a progressive environment to inspire change and progress beyond its boundaries?

OSU laid out a clear directive for our team: to physically support the institution's efforts to raise graduation and retention rates through increased student and faculty engagement. We were also challenged to develop large classrooms for active learning.

The facility needed to be able to serve a huge volume of students in spaces where people would feel inspired. We went through deep explorations of possible classroom formats with faculty, hosting multiple pedagogy charrettes and mocking up different layouts so the faculty could feel what it would be like to teach in each space. We also researched the ideal physical proximity and visibility between student and instructor, as well as the actor/audience relationship found in theatre.

Based on this preliminary analysis, Bora designed a series of academic spaces that included two in-the-round arena classrooms of 600 and 300 seats, and a parliament classroom of 175 seats. The larger arena collapses the distance between student and instructor to 35 feet, and four aisles extend from the central podium, allowing faculty to come within 15 feet of every student in the room. The smaller arena reduces the maximum distance to 25 feet.

Faculty received training from the Integrated Learning Resources Center, a new department with a space to test technology and equipment before it launches in the classroom. Additionally, a green room provides direct access to both the large arena classroom and a 400-seat lecture hall, allowing faculty to set up presentations before class, thereby streamlining the short transition between class periods.

RESOURCES & MORE

- https://thegeometryoflearning.wordpress.com/
- http://is.oregonstate.edu/rooms/learning-innovation-center
- http://bora.co/

LAGUARDIA MAKER SPACES

New York University

brightspot strategy

- How are students' motivations and behaviors changing and what spaces, services, and technology will they need in the future?
- How can we shift our technologyrich learning space from fixed places for individual work to flexible places for teamwork?
- How can we make the spaces, services, and technology that we offer more visible to students to increase awareness and usage?
- What should tech support look like in the future when we factor in more team work, more digital and physical making, lending devices, and a more mobile set of users?
- What are the metrics we should use to assess our progress? How will we gather feedback, learn, and adapt?

New York University's Instructional Technology group engaged brightspot to help plan two state-of-the-art maker spaces. Both facilities are in "storefront" locations on LaGuardia Place, a main thoroughfare on the Greenwich Village campus. In reconsidering the spaces and services offered in each facility, brightspot recognized an opportunity to brand each space with a unique role and specific identity.

After extensive user research and in collaboration with NYU staff and architecture firm Gensler, brightspot developed a vision, service strategy, and identity for the two facilities, and mapped out the experiences—physical and digital—available to students, faculty, and staff in each one. Both spaces opened in 2015 have been big hits since.

One space, the LaGuardia Co-op, is now a place for students to "connect and create"—to collaborate, learn, and interact with technology and with each other in new ways. The second space, the LaGuardia Studio, is a state-of-the-art facility for the NYU community to "form and fabricate" 2D and 3D objects through 3d printing and scanning.

In a post-occupancy evaluation of the Co-op, brightspot found that over 93% of students reported they were satisfied or very satisfied with the technology, 89% were satisfied with the space, and 72% were satisfied or very satisfied with staff.

RESOURCES & MORE

- http://www.nyu.edu/life/information-technology/locations-and-facilities/student-technology-centers/laguardia-co-op.html
- http://www.brightspotstrategy.com/

THE ENGINEERING BUILDING OVAL

North Carolina State University

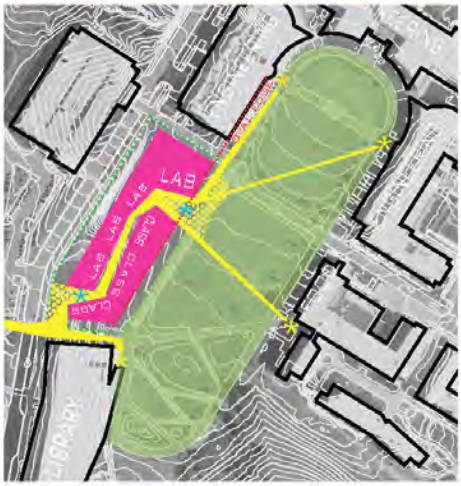
Clark Nexsen

spaces that work

KEY QUESTIONS

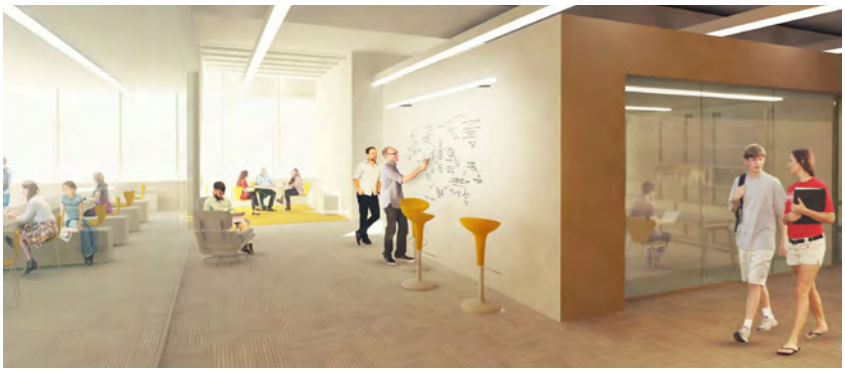
- When a project is to house two major departments, and where separation between the departments is important, what planning opportunities can be found to foster collaboration?
- How should departments be arrayed to achieve maximum visibility of "showcase" labs that could encourage cross-departmental conversations and create a broader community of engineering practitioners?
- How does the siting of these labs enhance the experience of the user moving through the space?
- When the project incorporates a disparate set of research labs, what influences common lab dimensions and other planning challenges?

BUILDING AS PATH



RESOURCES & MORE

- https://www.engr.ncsu.edu/oval/
- https://www.clarknexsen.com/
- http://pkallsc.org/events/2017-lsc-roundtable-north-carolina-state-university



Engineering Building Oval (EB Oval) promotes opportunities for synergy, collaboration, active learning, and community spaces to support broad initiatives in advanced materials and manufacturing, robotics and sensor technology, critical infrastructure and security, transportation and logistics, and energy and environmental systems.

Challenges include the need to balance a diverse set of program demands that may at times require accommodating competing needs, for example placing "Engineering on Display" when certain activities by nature may require a more "dirty lab" environment.

Additional challenges include addressing shifts in modes of learning and inquiry, blurred boundaries between departments that historically have been compartmentalized into individual buildings, and the needs of the next generation of faculty and students.

EB OVAL VISION

- Transcend the "now" by creating a place that supports the College of Engineering's continual pursuit of advancing engineering education, conducting breakthrough research, cultivating cross-disciplinary collaboration, and launching the next generation of engineering leadership.
- Become the embodiment of "Think and Do" (the NCSU brand). Allow the College to create the future by providing for new ways of doing things that are not possible today.
- Create "Beehives of Activity" of hands-on learning and inquiry that make visible and celebrate the accomplishments and aspirations of the College.
- Create a sense of community for a creative class of students and faculty within an ecosystem that supports both collaborative engagement and individually-focused work.
- Solve the "Knapsack Problem," working within the limits of available resources to seek the greatest value possible for advancing the mission and vision of the College and NCSU.

LIFE SCIENCES BUILDING

Loyola Marymount University

CO Architects

KEY QUESTIONS

- How can the design of the building promote interdisciplinary interaction and the de-Balkanization of departments? Why is this important?
- What is the importance of "science on display"? How does it support more open and welcoming learning environments?
- How can design—and the process of design—challenge pre-conceived notions of learning and teaching in undergraduate teaching labs? How do you get buy-in from faculty for more open environments?
- How do you balance the need for low-tech vs. high-tech spaces for interaction? Where should these spaces be located within a building?
- How, in the planning process, do you engage faculty and students from across campus and create environments that nurture cross-disciplinary interactions?
- What is the importance of exterior learning environments—for all students, for those using the interior learning spaces, and for entire campus community?

RESOURCES & MORE

- http://video.lmu.edu/life-sciences-building-introduction/
- https://coarchitects.com/
- http://pkallsc.org/events/2016-roundtable-loyola-marymount-university

"Our project is unlike any other undergraduate STEM project in the country and has supported more collaborative efforts between our faculty and students in the few months we have been open." — S.W. Tina Choe, Ph.D., professor and dean of the Frank R. Seaver College of Science and Engineering.

LMU sought to create a nationally recognized, state-of-the-art undergraduate science center in which learning and discovery are interdisciplinary and collaborative. Programmatic planning was organized around areas of focus, as opposed to disciplines, to foster a culture of collaboration. The building itself was to be a teaching tool and beacon for sustainable practices. It would place "science on display" and become an active participant in the education of the whole person.

The resulting complex holistically integrates all of these elements. Located near the Pacific Ocean with a year-round temperate climate, the building harnesses and embodies the Southern California lifestyle, taking advantage of the connection to nature and the indoor-outdoor relationship.

The mission was to break down departmental barriers and bring people together inside and outside of the laboratories by providing open, light-filled public meeting spaces, large glass walls separating corridors and laboratories, and the promotion of "science on display" through clear lines of vision onto the important work being conducted within.

Departmental boundaries are blurred through the placement of programmed spaces. The LMU campus is lush, bucolic, and filled with student-oriented recreation areas.

ACTIVE LEARNING CLASSROOM (ALC)

University of California, Santa Cruz

ehdd

spaces that work

KEY QUESTIONS

- How can we capitalize on campus-wide initiatives relating to UCSC's Student Success Strategic Plan (SSSP) in making decisions about planning, siting, and designing the new Active Learning Classroom (ALC)?
- Where is the best location for the ALC, physically and synergistically? What spatial affordances—size, adjacencies, openness, flexibility etc.—are important for the success of "flipping the classroom" as a pedagogical approach for introductory courses in STEM fields?
- What are the pluses and minuses of locating an ALC in the Science Library (SEL), recognizing its current and expanding role on Science Hill as a community hub, providing students study space and easy access to digital information and other technologies for learning?
- How can repurposing a space within SEL contribute to goals set forth in the SSSCP to support and enhance academic collaborations, elevate the dialogue around learning and learning spaces and, most importantly, help students thrive.
- Who needs to be at the table? How do we create a cross-disciplinary working group of stakeholders—STEM faculty and administrators, library administrators and staff, senior campus leaders? How do we ensure a shared understanding about how learning happens, how space matters, and a shared vision of student success?

RESOURCES & MORE

- https://library.ucsc.edu/
- http://www.ehdd.com/
- http://www.pkallsc.org/events/2016-roundtable-california-state-university-los-angeles

The new Active Learning Classroom is part of the first phase of the full renovation of SEL in support of the SSS Plan. It enables up to 95 students to be engaged during the designated class period in collaborative group work and problem solving. Furniture and technologies within the ALC are designed for flexibility, adaptability, and interaction, allowing students to work in collaborating clusters of 4 – 8 students, engage in interactive lectures, as well as sit in traditional exam formats.

A bold graphic wall between the ALC and the adjacent library commons emphasizes the synergy between the formal and informal spaces important for the "flipped classroom" pedagogical approach. With flat screen panels that can be a billboard for displaying research "happening" across Science Hill, this wall makes SEL and the ALC a focus of dynamic, collaborative cross-disciplinary conversations about learning and research in STEM fields.

One strategy to realize the goals of the SSSP was to undertake an ambitious program to revamp its introductory courses in biology, chemistry, and physics—replacing lectures with a more active learning approach.

Those involved in these discussions—including librarians and STEM faculty—came to the planning table with deep understanding of 21st century undergraduates and what contributes to their success as learners, including how space matters.

Together they explored research literature about the changing role of libraries when access to physical collections no longer defines a library. They examined best practices from the field about how active-learning pedagogical approaches led to greater persistence and success for STEM students, creating a significant resource library to inform these discussions.

NEW ENGINEERING HALL

Rowan University

Ellenzweig

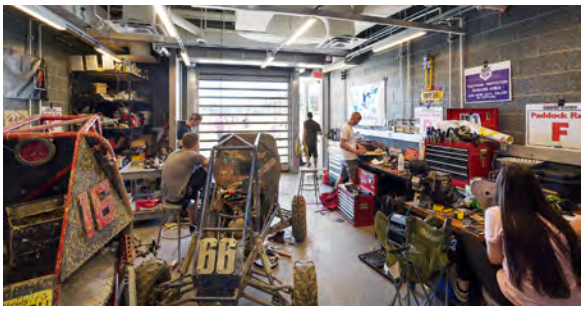
spaces that work

KEY QUESTIONS

- What collection of spaces will best serve today's teams of engineering learners and researchers who will lead the business endeavors of the future? How do these spaces support research and development that can be linked to regional, national, and international industry partners?
- What is higher education's role in equipping students to become proactive stewards of our environment? How do we ensure that an applied science environment provides students with a "sandbox" within which to experiment and develop viable sustainable alternatives?
- Do highly visible team-based student project labs attract undergraduates to STEM education and increase student success? Can first-year students envision themselves thriving in such an environment?
- With evidence of peer learning increasing student success, how do we create an environment that best supports group study and enriching collaborative spaces?
- With Science and Technology reaching new frontiers at breakneck speed, how do we "futureproof" research and teaching laboratory environments with enough flexibility of furnishings, overhead services for plug-n-play, and virtual collaborative technology?

RESOURCES & MORE

- http://www.vantagetcg.com/
- http://pkallsc.org/events/2016-roundtable-georgia-institute-technology



Envisioned to create a new engineering "complex" within the existing Rowan Hall, the new Engineering Hall houses teaching and research laboratories for biomedical, civil and environmental, and electrical and computer engineering. The building includes laboratory support spaces, shops, classrooms, faculty offices, collaboration spaces, group study rooms, and a student commons.

Electrical and computer engineering and biomedical engineering research labs are flexible and reconfigurable to support any type of team-based work. Instructional project labs with movable tables, perimeter monitors, and overhead electrical services permit computer-based research as well as the reverse-engineering, fabrication, and testing of devices.

The Center for Sustainability makes the building part of the educational experience, allowing students to, for example, study the effect on the room's HVAC system when different types of control systems are tested. Students and faculty freely collaborate in the corridors, , glass-enclosed collaboration rooms, and the commons.

Engineering Hall enhances the presence of the Henry M. Rowan College of Engineering and creates a gateway on Rowan University's western edge. The two facilities are connected at the ground level through new landscaping and at the third floor by a new bridge, which houses the dean's office suite and student interaction spaces, and provides an iconic entrance to Rowan University.

Visible south-facing photovoltaic panels are positioned on the bridge's roof and supplement the building with 22,174 kWh of electricity each year. The new landscape provides a heightened sense of campus community and creates enriching collaborative spaces for the engineering disciplines, including a roof terrace. The experiments plaza outside two automotive labs provides students with an outdoor venue in which to test their projects—a highly visible proving ground of sorts right outside the labs.

ACADEMIC INNOVATION CENTER

Bryant University

EYP Architecture & Engineering

spaces that work

KEY QUESTIONS

- How can the design of the building promote a culture of innovation in academic programs?
- How can we design for the future? How can we design to encourage innovation and new ways of learning?
- How do we create an environment of entrepreneurial thinking that reflects vibrancy and an experimental atmosphere as well as the structure and richness of the academic history in this geographic region?
- How can the design of the building create awareness and connections and encourage faculty and students to interact and collaborate inside and outside of formal instruction time?
- How do we capture the maker experience of rapidly-prototyping ideas in a non-STEM facility?
- How essential is territorialization in a dynamic academic environment? What are the boundaries that should be defined by the physical environment?

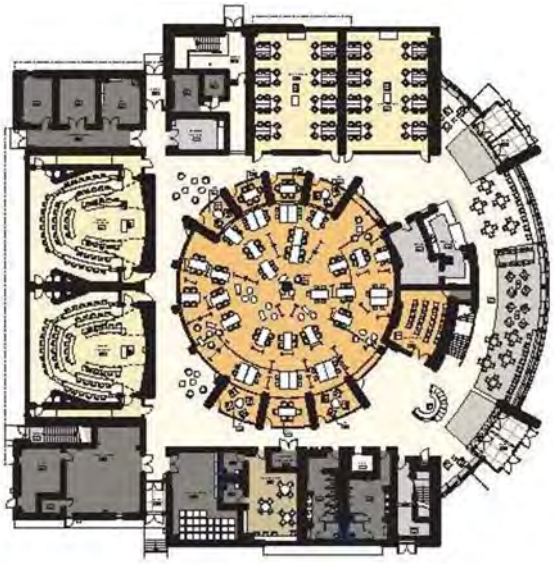


Photo Credit: Floor Plan, Level 1 EYP, Inc.

Promoting a culture of innovation in academic programs Bryant University's ambition to create a new type of entrepreneurially focused, collaborative learning environment grows out of an innovative and experimental academic culture that embraces evolution and advancement of new ideas and methodologies.

Although traditionally focused on many programs t of interest to students planning on entering the business world, the Academic Innovation Center embraces a diversity of curricular topics. The building design grows from years of experimenting with many different configurations of flexible, flat-floor classrooms with movable furnishings, and encouraging faculty and students to utilize classroom time for experiential, problem solving exercises.

One approach that Bryant University opted for in the design of the AIC is to eliminate faculty offices. Instead a shared "nesting" space is provided to temporarily host faculty during their class time and to provide them with personal space before or after class.

One reason for doing so is to make these dynamic learning spaces curriculum and need driven (in terms of features), which promotes and encourages experimentation as the classrooms themselves do not belong to any particular department or program.

RESOURCES & MORE

- https://www.eypae.com/
- http://pkallsc.org/events/2016-roundtable-boston-university

CENTENNIAL CENTRE FOR INTERDISCIPLINARY SCIENCE

University of Alberta

Flad Architects

spaces that work

KEY QUESTIONS

- How can a major new facility anticipate and advance academic science programs over the next 50 years? How will long-term quality be realized by attention during planning to laboratory flexibility and adaptability, emerging technologies, contemporary pedagogical approaches, and sustainable energy/building and management systems?
- Can the limitation of the footprint of the building become an asset when the program requires more space than can be accommodated by the available site?
- How can "art" integrated within the architecture deepen student learning, spark discovery, and creativity?
- What is the impact of climate on how we give attention to how spaces are connected, separated?
- How will students, can students, understand how to use the spaces we are designing and constructing?

The context of community is central to this academic environment that combines diverse thinking, visual contact, improved opportunities for interactions and the cultivation of ideas—ultimately, intended to increase the pace of research and discovery.

Complicated by the lack of available footprint for the facility, the planning process required a solution that respects the scale and identity of the original campus buildings, the public role of the facility on the Main Quad, and the need to engage the public in university functions and activities.

The planning process was defined by a desire to innovate and reimagine the future of science learning on campus. The University President defined this as the desire to look for where the next scientific discoveries would come from, with the aim to build scientific infrastructure that rivals the best in the world. The strategy includes the assembly of diverse scientists with common interests to address complex problems of global importance.

The expectation is that cross-disciplinary arrangements of significant scale will increase the effectiveness of science through better integration of University resources, the development of innovative skills, and the attraction of critical talent.

The facility engages a unique population of undergraduate and graduate level functions, spaces, and scale—thousands of students, researchers and faculty interact in the Centre on a daily basis. The CCIS enhances and connects the learning process through visual, personal and experiential connections with science.

RESOURCES & MORE

- https://www.ualberta.ca/science/about-us/facilities
- https://www.flad.com/
- http://pkallsc.org/events/2016-roundtable-georgia-institute-technology

FIRESTONE LIBRARY RENOVATION

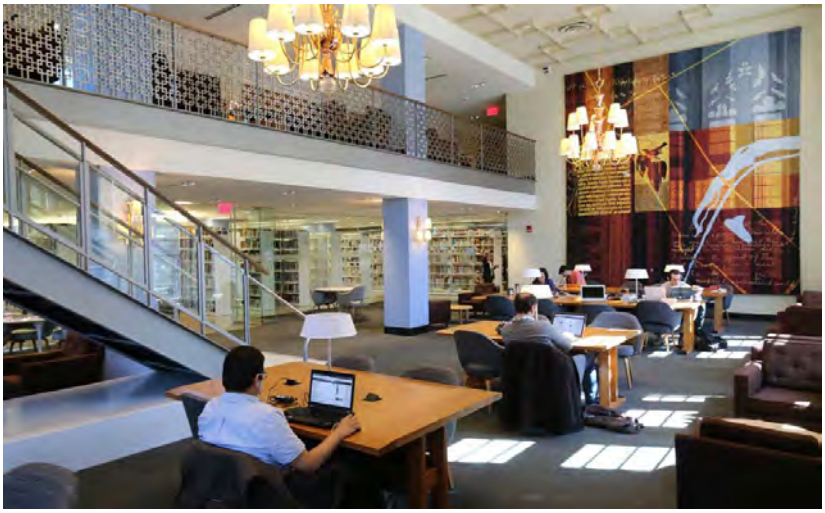
Princeton University

Frederick Fisher and Partners (FFP)

spaces that work

KEY QUESTIONS

- How do we transform a 50-year-old library of libraries—one with many technical and planning challenges—into an active learning center?
- How can we make "legible" a building that has had multiple additions over many years and now accommodates many different programs?
- How can a major renovation be undertaken and completed while maintaining building operations and services?
- How do we keep 6,000,000 volumes of books accessible while we provide new venues for learning across this library of libraries?
- What kind of integrated learning opportunities will be accommodated in the new and renovated spaces? How do we create learning spaces that promote group interaction yet allow for individual study?
- What kind of "signature" spaces" that focus on the experience of the user need to be activated?
- In the process of planning, how do we make rare books celebrated, accessible, and integrated into the process of learning for all students?



Firestone Library has been the academic heart of Princeton University since its completion in 1948 and is the last collegiate Gothic building on campus. FFP created an aesthetic that both preserved history and created a 21st century research environment with greater transparency and connectivity.

Design Framework/Project Drivers:

- Develop a strategy to increase legibility and transparency to encourage collaboration
- Create a wide range of learning and study spaces for multiple user groups
- Create a sense of place within the stack area
- Bring multiple user groups back into the building
- Make the rare book collection accessible

A key concept to the renovation is the notion of "domesticity." Firestone is a "library of libraries," housing personal collections given to the University over time. The new design creates areas of intimacy, warmth, and comfort. Vast stack areas are relieved by small, living-room-like reading "oases," a planning device derived from the original design with modern interiors that meet contemporary ergonomics, study patterns, and sustainability standards.

RESOURCES & MORE

- http://library.princeton.edu/
- http://www.fisherpartners.net/
- http://pkallsc.org/events/2016-roundtable-loyola-marymount-university

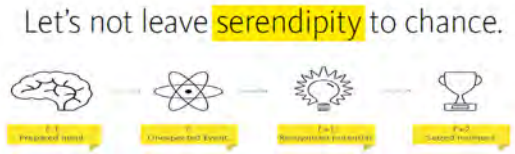
SCHOOL OF BUSINESS, CAPITAL FEDERAL HALL

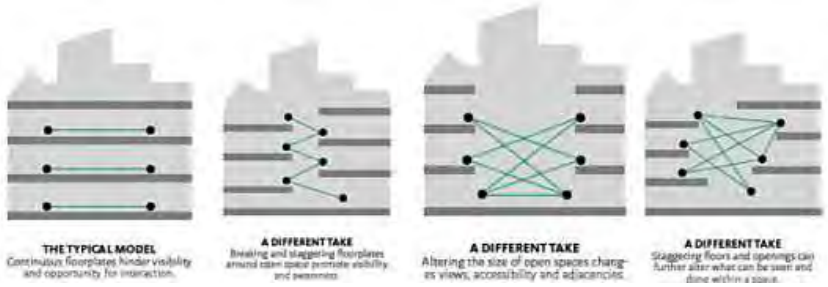
University of Kansas

Gensler

KEY QUESTIONS

- Awareness: How do we manufacture spatial configurations that drive awareness of the learning experience through visibility, vertical integration, and cultural connectivity?
- Proximity: What do we know about manufacturing spaces that enable proximity, aware the probability of knowledge exchange is proportionally related to the proximity of co-workers (co-learners)? Being on a different floor is being in a different world. (Tom Allen—MIT)
- Connectivity: What do we know about manufacturing spaces that enable connectivity, enable the informal, chance encounters that support dynamic connections, networking connections?
- Ambiguity: What do we know about manufacturing departmental networks, about translocating people and programs in ways that break-down departmental silos?





People believe that serendipity is about luck or about finding value in chance. But what if it's not? What if it can be manufactured? We think it can.

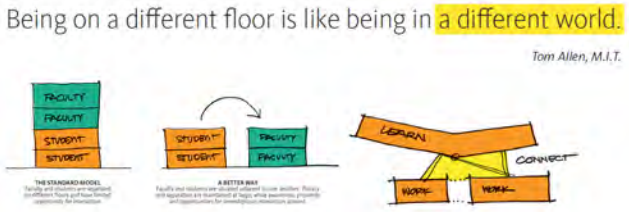
If the traditional model of faculty offices being isolated from learning space was upended, would collaboration take hold? If faculty and students could always see each other, and were encouraged to interact with increasing frequency, would something magical take place? We think it would.

On many college campuses, faculty offices are, by design, remote from where learning actually takes place—often perched high above the students logically because of code exiting requirements. At the University of Kansas' new 167,000 square-foot Business School, Capitol Federal Hall, faculty are on full-display of students, and students of faculty. Classrooms, incubators, and financial laboratories occupy a single, linear volume, while faculty and administrative offices occupy a neighboring one.

Between them, a four-story atrium with a dynamic stair plays the crucible—the birthplace of innovation. The ground floor is split on two elevations, stitched together by a serpentine social stair which doesn't simply play lip-service to the campus' notable topography, it marks the transition from the plains that typify the far reaches of the University to Mount Oread. It provides a crucial place for students to gather and observe.

The architecture is a simultaneous nod to the University's architectural legacy and a bold charge toward its future. The building opens itself to Allen Fieldhouse, the cultural center of campus, and many of the key spaces within offer framed views of the hallowed arena. In negotiating the old and the new, the high and the low, the student and the teacher, Capitol Federal Hall doesn't just hope for the serendipitous. It creates it.

This is how you spark innovation. This is what's next in business.



RESOURCES & MORE

- http://capfedhall.ku.edu/
- https://www.gensler.com/
- http://pkallsc.org/events/2016-roundtable-university-illinois-chicago

MISSOURI INNOVATION CAMPUS

spaces that work

A collaboration between University of Central Missouri, Lees Summit School District, Metropolitan Community Colleges, and regional business partners

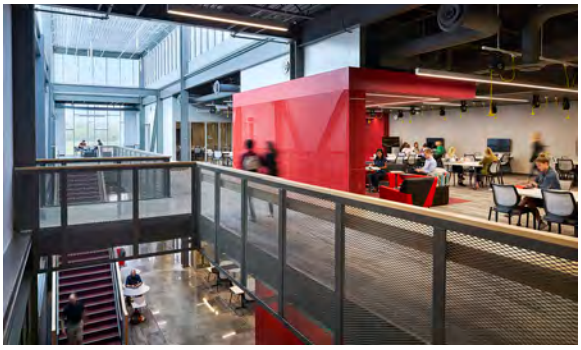
Gould Evans

KEY QUESTIONS

- How can inventive educational models reduce student debt and accelerate the time it takes to reach high earning potential?
- How can partnerships among businesses and institutions improve the relevancy of the educational experience and better equip graduates with job-ready skills, all the while helping them pay for college via paid internships throughout their schooling?
- How can business partners be more engaged in curriculum development, and the on-going re-evaluation and updating of the curriculum to ensure value and relevancy of students' investment in their education?
- How can education better equip students with key competencies that are in high demand among employers—skillsets that will help enhance their leadership ability and accelerate transitions into higher level positions within the workplace?
- How can the facility for such a unique program take lessons from innovative workplace design to achieve business agility via flexible design—agility in facilities planning, academic programming, and pedagogy?

RESOURCES & MORE

- https://www.ucmo.edu/mic/
- https://www.gouldevans.com/



The Missouri Innovation Campus (MIC) is a program serving grades 10-16 using unique partnering strategies to invent a new learning model and create the nation's most accelerated degree program. Agreements between a public school district, a state university, and a community college system offer a nimble set of academic alternatives to provide students with options for multiple accelerated pathways.

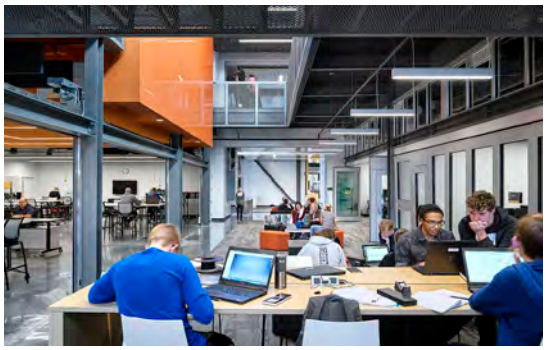
The MIC program began in 2011 to address the concerns of 21st century students who want to graduate earlier with less debt and higher job placement rates as compared with traditional "obsolete" college programs.

To fulfill these needs and address the questions above, the Missouri Innovation Campus's new facility features a collection of open learning environments ("flex studios") that optimize collaboration and professionalism akin to professional work environments.

The facility also offers open departmental quads made up of a collection of flexible and porous studios, labs, and ideation commons. In these quads, authentic work-like, cross-disciplinary behaviors are fostered by an environment that replicates the pace and diversity of creative workplaces.

The ideation commons serve as a third place within the school to support creative work and several modes of design thinking. Openings through the second floor create vertical connections between departments, further encouraging cross-disciplinary pursuits among students.

This innovative learning environment helps students to become self-directed and develop professional mindsets that will help them hit the ground running as they transition into full-time careers.



RENOVATION AND EXPANSION OF STEM FACILITIES

spaces that work

Rhodes College

Hanbury

KEY QUESTIONS

- How can we break down the silos and foster relevant interdisciplinary connections for students and faculty through re-design and the design of new space?
- What process can deliver the long range vision for a state of the art science department and achieve the successful transformation of multiple aging facilities, over several incremental phases, sustain the academic program through all phases and keep a critical eye on the long range vision for world class science facilities?
- How can we transform through design a disparate set of introverted historic structures with a reputation for 'isolated, basement like accommodations' into a vibrant 21st century academic community in the heart of the campus with enhanced academic and civic contribution to the attractions and retention of top students and faculty?

Completed in 1965, the Frazier Jelke Science Center (Biology) was constructed below grade with a plaza, the Rhodes Tower (Physics) and Ohlendorf (Math) sitting above. The building also connected to the basement of Kennedy (Chemistry, c. 1935). Opportunities for interactions outside the classroom were limited to a series of below grade corridors that provided no social space for students and faculty engagement. Exterior "gardens" located at the lower level provided daylight for some spaces but had limited value as spaces for collaboration.

While accommodating the need for growth in STEM related programs, Rhodes also wanted to enhance the opportunity for collaboration amongst students and faculty outside of the classroom and increase the level of interdisciplinary activities.

The solution was a series of renovations and the construction of a new interdisciplinary science building. Renovations will include recapturing underutilized space, transformation of aging laboratories and by enclosing one of the below grade gardens, the creation of a new social center for the sciences. Distributed throughout all of these facilities will be spaces for collaboration among students and faculty.

In addition to renovation of the existing science facilities, the former student center, Briggs, is being converted to classrooms and labs for math and computer science. Briggs will also provide a new multipurpose space for the science complex overlooking one of the many quadrangles on campus. Robertson Hall (the new interdisciplinary science building) will also face the quad and connect to Frazier Jelke at the basement level.

Robertson Hall will provide new chemistry and biology teaching labs in addition to much needed research space. The new building, designed to fit within the Collegiate Gothic Architecture of the campus, will become a hub for interdisciplinary activities and has been designed to optimize student engagement with the sciences.

RESOURCES & MORE

- https://www.rhodes.edu/stories/rhodes-college-unveils-new-34-million-cutting-edge-science-facility
- http://www.hewv.com/

COLLABORATIVE BIOLOGICAL TEACHING LAB CENTER

Northwestern University

Harley Ellis Deveraux

spaces that work

KEY QUESTIONS

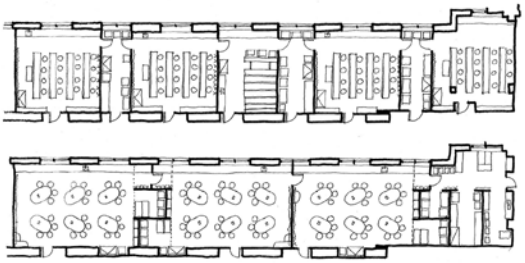
- How can a vibrant, interactive, and collaborative teaching lab be carved out of a long and narrow swath of space with rigid physical restraints?
- How does the shape and arrangement of Student Work Stations impact learning?
- How can space layout reinforce a team-based learning pedagogical style?
- What are the primary features of a collaborative teaching lab?

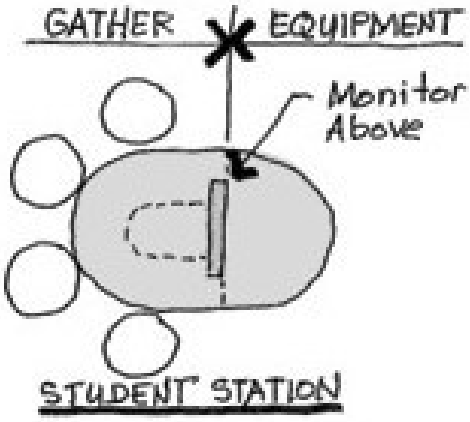
The current pedagogical style and lab protocols garner high praise from students. The class was nearly ideal, except the existing spaces are anything but that. The labs are too small with long, narrow, fixed benches with minimal circulation aisles, barely wide enough for seating and no space or accommodations for students to face one another to engage in some form of collaborative process. Students excelled in these classes despite the inadequate layout.

The existing space to be renovated is rigidly constrained on two sides which limited any attempt to increase the area per lab. The solution was to reshape the typical Student Station to accommodate the necessary flow of students, facilitators, and materials. We also took the approach of French chefs and laid out the lab spaces according to the philosophy of *mise en place*, a culinary phrase which means "everything in its place".

Each Student Station of four is custom designed to accommodate their immediate needs and "tools": collaborative capsule-shaped table tops with integrated processing and a monitor that is remotely lowered from the ceiling, drawers for (4) microscopes, and an enclose base cabinet with space to accommodate all the small bench top work that the students need to do every day.

Shared equipment is located along a lengthy perimeter wall: everything is readily available to all the Student Stations. Large equipment (heat generating and noisy)needed in the lab, but for limited times, is located in an alcove designed to contain and minimize the noise and excess heat while being within easy reach of all tudents in any lab. There are dedicated student cubbies located within the lab and visible to all limiting the likelihood that things will go missing.





RESOURCES & MORE

- http://www.northwestern.edu/
- http://www.harleyellisdevereaux.com/

NEW CORE SCIENCES FACILITY

Memorial University of Newfoundland

HOK

spaces that work

KEY QUESTIONS

- What will be the challenges and opportunities of integrating sciences and engineering into a core interdisciplinary STEM facility?
- How will institutional goals—increased student enrollments in STEM fields, recruitment and retention of world-class faculty and students—drive our planning?
- What clues do we take from local building traditions and our setting—positioned on a signature site—to create a new gateway into the building?
- How can we create pathways and amenities that serve multiple populations, mix disciplines in an openly transparent environment, and invite students at every stage and background to participate in interdisciplinary learning and research?
- How will we create a "place of choice" for the broader community?

Providing interdisciplinary learning and research space for faculty in both science and engineering, the 450,000 square foot building, which takes design cues from natural elements and local building traditions, is positioned on a signature site that creates a new gateway into the campus.

Flexible lab neighborhoods integrated with pathways and amenities that serve multiple populations mix disciplines in an openly transparent research and learning environment that invites students at every stage and background to participate in scientific research and discovery. Science and engineering will be put on display inside and outside of the building.

Active-learning settings utilize flexible furniture and flat panel screens for small group work. Electrical and computer studios include electrical benches with utilities and pod workstations for groups along with table and chairs for teams to cluster and ideate.

Building upon Memorial University's conviction that the very best comes from bringing diverse programs and people together, the new facility designates 125,000 square feet for incubator/industry partner collaborative research space. Enabling external collaborations and commercialization, this space is infused throughout different zones in the new building.

Growing the Core Research Equipment & Instrument Training Network program (CREAIT) at Memorial University is a key objective as well. These research cores are strategically located at the building's front door with accessibility and transparency where appropriate to celebrate research.

RESOURCES & MORE

- http://www.mun.ca/csf/
- http://www.hok.com/
- http://pkallsc.org/assets/files/ckfinder/Memorial-University_HOK.pdf

WENTZ SCIENCE CENTER

North Central College

Holabird and Root Architects

spaces that work

KEY QUESTIONS

- How can we create a dynamic new science facility for the campus while respecting the restrained dignity of the adjoining residential neighborhood?
- How can we provide a new facility that is over twice the size of its predecessor, while creating a stronger sense of community among the STEM disciplines?
- How do we put science on display in a way that is unique to the College's culture?
- How can we engage the larger campus community, including non-science majors, and draw them into the new facility?

We addressed these questions by working in close collaboration with both the College community and the residential neighborhood surrounding the campus. The residents were concerned that a new, enlarged facility would disrupt their neighborhood not only with its size but with the activity it would generate.

We responded by locating the quieter faculty offices along the residential street and orienting the active communal spaces and main entries toward the center of campus.

Because the new science center was to house more than double the number of programs as their existing facility, it was critical to strengthen the interdisciplinary community. To this end, we worked with the faculty to provide projecting bays containing public spaces that look out toward the campus and allow by-passers to see the activities taking place within.

This transparency is further enhanced by view windows that look into the adjacent laboratories and by visual displays that illustrate the disciplines housed within the facility.

Finally, it was important to the College that the new facility engage the larger campus community. Spaces were incorporated into the building to attract the general population, including flex space that can accommodate a reception of 300 people, general classrooms, and a café/ sandwich shop.

RESOURCES & MORE

- https://www.northcentralcollege.edu/taxonomy/term/898
- http://holabird.com/

INTERACTIVE STUDIO CLASSROOM

Boston University

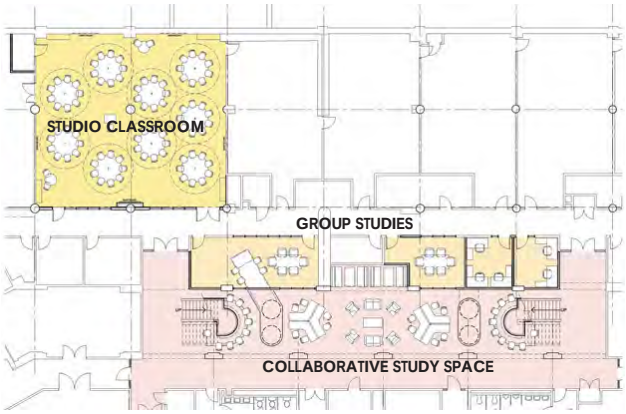
ICON Architecture, Inc.

KEY QUESTIONS

- When renovating for active-learning pedagogies, what do we have to know about how the space will be used:
  - How will instructors and teaching assistants interact with students in the physical and virtual spaces we are designing?
  - How will students interact with one another and the advanced technologies to be placed in the room?
- What are the criteria for an interactive studio classroom? What kind of furniture will best support our goal of a space for formal and informal learning, of a space for problem-driven learning and learners?
- How can spaces adjacent to the planned active-learning classroom be repurposed to support extended learning opportunities for students—before and after the formal class period?
- What opportunities do we have in planning these spaces to signal to the larger Boston University community the value and impact of this new kind of learning space?
- As a prototype space, how will the new classroom help the broader University community beyond the Physics Department access and appreciate active-learning environments?

RESOURCES & MORE

- http://www.bu.edu/ctl/guides/stem-education-resources/
- http://www.iconarch.com/studio-classroom
- http://pkallsc.org/events/2016-roundtable-boston-university



Designed to seat 81 students, the technology-rich environment merges all classroom computers and projectors into one shared system through innovative use of the University's extensive AV/IT data network. In this way, student laptops are leveraged into an interactive learning environment instead of being a source of distraction. In support of the SCALE-UP teaching philosophy, the adjacent collaborative study area features open group-work stations, lounge furniture, booths as well as individual seating, and group study rooms.

The creation of the Interactive Studio Classroom was a highly collaborative process. It was also a process of creating something new for the University: the first active learning environment. Everyone involved understood that we were developing a prototype for the University.

On paper, the project is a straightforward renovation. In reality, the design team, Physics Department, College of Arts and Sciences, Facilities Management, and the Department of Educational Media and Technologies had to think through a wholly new way of teaching and learning, deciding how the new technologies would be integrated with campus standards and how this new space would be configured and furnished.

The goal of studio physics is to integrate technological innovations with new pedagogical tools that emphasize active-learning techniques. Professors, teaching assistants, and learning assistants circulate around the room, engaging students by asking probing questions and guiding their self- and peer-learning.

This interactive, Socratic style of teaching forces students to think deeply about core concepts, creating a classroom atmosphere full of lively interactions between students and teachers.

ENGINEERED BIOSYSTEMS BUILDING

Georgia Institute of Technology

Lake | Flato Architects

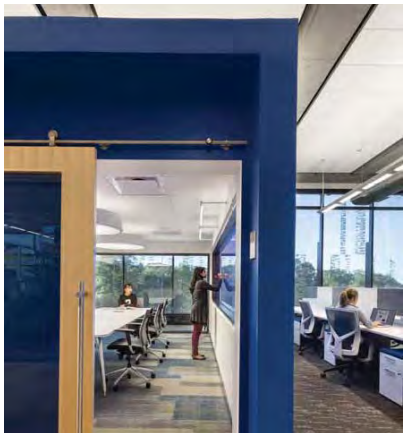
KEY QUESTIONS

- Collaborative environments are as much a result of a collaborative programming and design process as they are the result of an architectural response. How do we integrate our clients and their community more effectively into the design process?
- What synergies in programs and systems can be identified to balance building efficiencies with the increasing need for communal and collaborative spaces in laboratory buildings?
- How do we create communal spaces on the ground floor of a building that houses programs requiring high attention to security?
- How can our planning challenge traditional ways of programming STEM research facilities without alienating current building users?
- How does the natural environment inform programmatic needs, siting, and adjacencies?

The Engineered Biosystems Building's (EBB) interactive and open-lab environment is enhanced by transparency and an ease of collaboration that extends to two-story break-room spaces that bookend the building on alternating floors. This design ultimately encourages those with break-rooms on their floor to move vertically as well as laterally throughout the building. This circulation pattern allows for serendipitous interdisciplinary interactions that may not otherwise occur if researchers had all the amenities in their immediate work area.

Spaces that require privacy remain in thoughtful proximity to the lab neighborhoods, and where needed, glass partitions interrupt open space to provide privacy between the graduate student offices and open-lab spaces. The building café offers an additional place for researchers to gather with colleagues from neighboring buildings.

The EBB reconceptualizes laboratory design, creating an interdisciplinary environment that supports the acceleration of advanced research and development. EBB brings together chemists, engineers, biologists, and computational scientists to foster interdisciplinary collaboration in research neighborhoods designed around specific areas of focus. Encouraging active engagement and collaboration among researchers of different disciplines was a core driver in the research facility's design.



RESOURCES & MORE

- https://ebb.gatech.edu/
- https://www.lakeflato.com/
- http://pkallsc.org/events/2016-roundtable-university-washington

GROSS HALL FOR INTERDISCIPLINARY INNOVATION

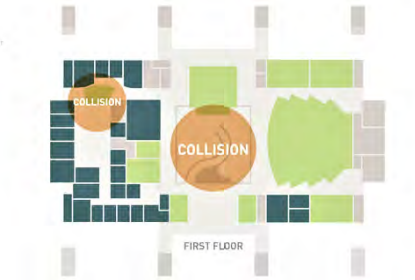
spaces that work

Duke University

Lord Aeck Sargent

KEY QUESTIONS

- How can a small portion of an unloved, Sputnik-era science building scheduled for demolition be repurposed in the short-term to experiment with creating an economical "pop-up" environment for collaborating and creating?
- What lessons can be learned from this "pop-up" experiment to demonstrate our commitment to sustainability and interdisciplinary innovation?
- As renovations proceeded, we asked: What lessons are we learning from this "popup" experiment about the mix of spaces, furniture, and technologies that allow optimum learning opportunities for individuals and groups?
- As the first makerspace was realized, various stakeholders addressed this question: What are the essential components of a home for learning that encourages tinkering and informal investigating?
- From creating the "pop-up" to moving into Gross Hall, how are we now assessing how well it meets our goal as a single space for interdisciplinary innovation for a diverse mix of non-science and science faculty at Duke?



RESOURCES & MORE

- https://sites.duke.edu/grosshall/
- http://pkallsc.org/events/2016-roundtable-georgia-institute-technology

Completed in 2014, Gross Hall now includes numerous highly adaptable, modular wet and dry research labs to support constantly changing and evolving research initiatives. The lower basement levels of the building have been redesigned as interconnected research and teaching spaces associated with large and small scale electro-mechanical equipment and fabrication.

This confluence creates a unique facility at Duke with the ability to house a wide range of course-related, co-curricular, and entrepreneurial-fabrication focused projects and activities.

Highly-collaborative formal and informal social spaces complement the technology-rich classrooms, project-based teaming spaces, faculty and staff offices, and administrative space. "Winter Garden," a sky-lit atrium, connects the second and third floors and intentionally brings together diverse campus groups for informal gatherings and teaching activities.

An interdisciplinary makerspace—The Foundry—has created a buzz of excitement on the Duke campus among faculty and students interested in a center for informal exploration, fabrication, and tinkering.

SCHOOL OF EDUCATION

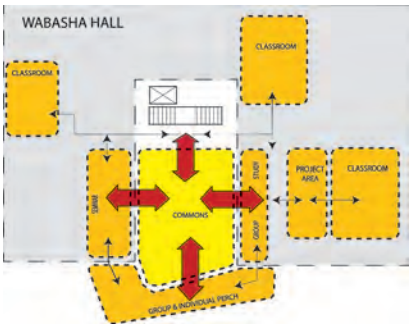
Winona State University

LEO A DALY

spaces that work

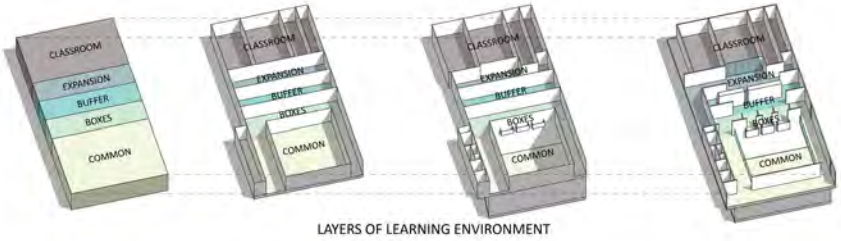
KEY QUESTIONS

- How do we react to, take advantage of the existing building's opportunities and limitations in ways that supports the vision of the College of Education (the tenants for the renovated spaces)?
- How can the physical environment help open minds? How can it also encourage future teachers to do the same?
- Given the evolution of educational technologies, how do we arrive at spaces for the College of Education that remain relevant? What aspects of the current social media culture are lasting, promote genuine learning? What opportunities should be provided to capture learning as digital content and then share it? What are the effects of technologies on space?
- How do create spaces that enable group learning? How do we enable this to happen in formal and informal spaces? When, where and why do groups interact now? How will they interact in the future? What kind of spaces will enable such future interaction?



RESOURCES & MORE

- https://www.winona.edu/education/educationvillage.asp
- http://www.leoadaly.com/
- http://www.pkallsc.org/events/2016-roundtable-california-state-university-los-angeles



LAYERS OF LEARNING ENVIRONMENT

This project was sparked by the need for the University to relocate and reshape their several departments and programs focusing on teacher education. Individual programs, sprinkled across campus, were each outgrowing their space. Scattered across campus, there was little opportunity for the cross-disciplinary discussions that pollinate conversations about new directions in teacher preparation, build community, and spark attention to new directions in research and practice in teacher preparation that can be translated into curricular and programmatic initiatives. The goal was to position the College of Education (COE) as a leading institution of teacher education.

The dream of a new COE began to be realized when the University acquired land across the street from the campus on which were clustered a small group of buildings that had been schools. These buildings—in their character and their accessiblity to the campus—were the obvious candidates to be repurposed into a new Education Village.

The core of the Village is Wabash Hall, with an existing outdoor courtyard that provided an opportunity to create a commons that served as a gathering place for students, faculty, and others to causally interact at several scales. It also serves as the starting point from which to move to, into, and through spaces on upper floors—spaces for planned and opportunistic learning, that can be assembled and reassembled to accommodate groups of various sizes.

Each of the other two buildings, the Cathedral School and the Wabash Recreation Center, have been redesigned in ways that promote and advance teacher educations and continuing education of teachers. With planned additions, this cluster will adopt a forward-looking aesthetic, while drawing on the unique local geology of bluffs and dramatic hills formed of Winona stone.

ODEGAARD UNDERGRADUATE LIBRARY

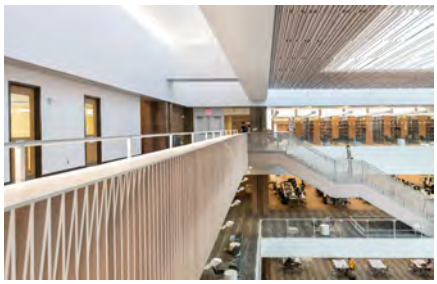
University of Washington

Miller Hull

spaces that work

KEY QUESTIONS

- How can we create "the students' office on campus," which provides all the resources they need to pursue their educational interests?
- What strategies can we use to make library resources more approachable, explorable and transparent to students?
- What learning activities are most relevant to our users and how can they be fostered through the design of space?
- For a university with many buildings and classroom types, what should the next leap in active learning classrooms look like?
- How can we shorten the University's capital projects typical process from 45+ mos to 22 mos max to satisfy legislative funding requirements, while maintaining inclusive stakeholder input and creative design solutions?



RESOURCES & MORE

- http://www.lib.washington.edu/ougl
- http://millerhull.com/
- http://pkallsc.org/events/2016-roundtable-university-washington

In the fall of 2011, the University of Washington hired the Miller Hull Partnership to undertake a significant renovation to the 1972 Odegaard Library. The team was tasked with creating "the students' office on campus," with active teaching and learning a vital part of the program.

A core group of library faculty, staff, teaching and learning experts, and architects identified a series of learning activities that would be most vital, and then designed a series of architectural solutions that specifically addressed each one. As a whole, they came to define the new interior of the library and created newfound student space and resources.

In addition to developing these learner-centered experiences, the team was required to master plan, design, construct and re-occupy the facility within 22 months (in order to satisfy legislative criteria); while keeping the facility open 24/5.

In the spirit of collaborative learning, the University, architect and contractor created a nimble and integrated way of working to deliver the project under these constraints.

Today, the library serves nearly 10,000 students a day around the clock. Spaces were designed as scheduled classrooms by day, and become student-owned study space by night. A co-located research and writing center brings together graduate student writing tutors with Library research faculty and staff.

Faculty from dozens of departments now sign up to use the hi-tech active learning classrooms; and the University is building out the next leap in active learning classrooms, based on continuing assessment data from Odegaard.

ACADEMIC SCIENCE CENTER

University of Kentucky

Payette

spaces that work

KEY QUESTIONS

- How do we accommodate large enrollments while providing an intimate, hands-on, discovery-based student experience?
- How can new curricula foster innovations in lab design?
- How do continuing advances in technology influence undergraduate STEM curricula?
- How can we program our spaces to enhance and prioritize safety alongside innovation?
- How can we build spaces that remain adaptable and flexible 50 years from now?
- How can we design spaces to encourage academic support for student success?
- How can we make an edge building central to the campus?

We grappled with how a flagship state university can create a cost-effective STEM education space for a large student body and innovate to meet the demands of a new curriculum embracing interactive learning approaches, hands-on lab discovery, and research opportunities. The design of the Don & Cathy Jacobs Science Building had to successfully scale-up learning environments to accommodate over 35,000 students a year.

Designed to accommodate biology, chemistry, and neuroscience, the building fosters an interdisciplinary culture and provides 200- and 300-seat collaborative, tiered lecture halls that act as a resource for all students.

The science building serves as a campus gateway and a point of connection between the University's academic core, medical campus, and student residential district. As both a destination and a crossroads on campus, the building engages pedestrians through a ground-level atrium. The atrium acts as a crossroads for both vertical and horizontal circulation through the building.

Plentiful informal learning spaces of different types and sizes help to create a welcoming, active engaged and vibrant culture for science and non-science students alike. It has become a central part of the undergraduate academic experience for the University.

RESOURCES & MORE

- https://www.payette.com/
- http://pkallsc.org/events/2016-roundtable-boston-university

WATT FAMILY INNOVATION CENTER

Clemson University

Perkins+Will

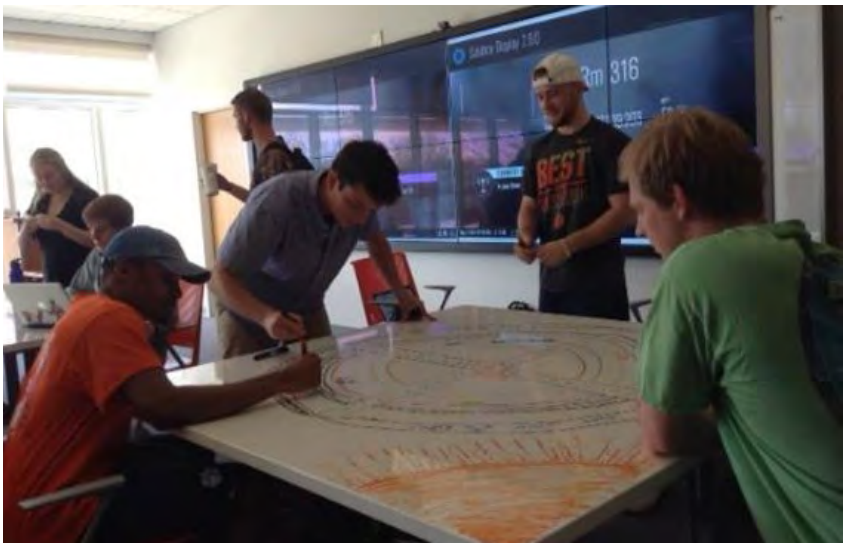
spaces that work

KEY QUESTIONS

- How do we create a campus-wide "heart" for student engagement and innovation?
- How do we address our goal of developing the technology-enhanced, problem-solving skills of our students?
- How do we design spaces in which students can be immersed in critical-thinking scenarios that deepen their learning?
- What tools, spaces, and spatial relationships—and events—will attract, retain, and support faculty and students of the highest caliber?
- How do we create a visible destination for collaborative efforts that engage our students and faculty as well as our industrial, governmental, and academic partners to ensure a bright future for our students?
- What does an agile, timeless environment for research and learning look like?

RESOURCES & MORE

- http://www.pkallsc.org/events/lsc-webinar-learning-spaces-matter-academics-and-architects-conversation-continues
- http://pkallsc.org/events/2016-roundtable-georgia-institute-technology



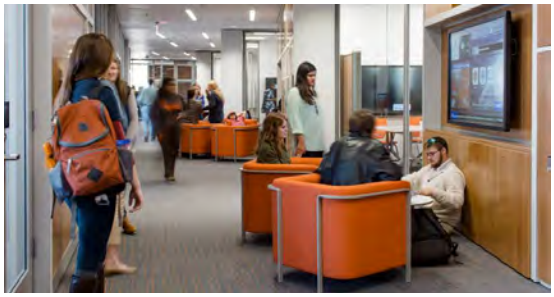
Clemson University's new Watt Family Innovation Center (WFIC) provides a unique environment in which advanced instructional technologies foster student engagement and industry partnerships to address real-world complex problems.

While the WFIC is primarily a University-wide resource for innovation, the building also serves as a home to experiment with new learning models for general engineering courses – exposing first-year students to real world challenges that inspire deeper learning.

The design team worked rigorously with Clemson University to generate a cohesive design response to the driving questions facing the project.

Through visioning sessions, research, and exploration, the team was able to apply new technologies, implement systems in unique ways, and uncover a wealth of opportunity through the establishment of industry partnerships during the design and construction process.

The building's raised-access floor system and demountable walls allow rooms to be rapidly reconfigured. The glass walls, natural light, and views to the sky provide a vibrant atmosphere that puts the creative activities of the center on display.



GEHL-MULVA SCIENCE CENTER

St. Norbert College

Research Facilities Design

spaces that work

KEY QUESTIONS

- How can a Sputnik-era science building be transformed into a modern, captivating active-learning environment for both science majors and non-majors?
- What attributes of the existing facility lend themselves to renovation for laboratory vs. non-laboratory functions?
- What features can be designed into the renovated facility to support changes in pedagogy, technology, and equipment over the life of the building?
- How can the planning process facilitate the development of a common vision among all disciplines and stakeholders that demonstrates the interconnectivity of the sciences?
- How will the rejuvenated science facility promote transparency and put science on display to engage occupants and visitors?
- How can the addition and renovation components be phased in to facilitate continuity of programs during construction?

RESOURCES & MORE

- http://www.rfd.com/
- https://www.snc.edu/naturalsciences/gms.html
- http://www.pkallsc.org/events/2016-roundtable-california-state-university-los-angeles

An analysis of the existing building revealed that it was structurally sound with a good column grid conducive to accommodation of modern laboratory layouts. As such, additions at each end of the existing facility were built to house non-laboratory spaces such as faculty offices, classrooms, and collaboration spaces. The existing building was renovated to provide modern laboratory spaces for learning and discovery.

Construction was done in phases to allow the science departments to remain open for course instruction and research. The existing building was completely re-skinned to modernize the exterior within the campus context and provide much larger windows for increased natural light and views.

The renovated interior features expanses of glass for "science on display" with views into laboratories and display of scientific artifacts. The laboratories are designed to be flexible and adaptable to accommodate change over the life of the building.

The completed facility provides a welcoming, comfortable environment that supports active and collaborative learning.

E. CRAIG WALL JR. ACADEMIC BUILDING

Davidson College

Shepley Bulfinch

spaces that work

KEY QUESTIONS

- How do we get faculty and students to move throughout the building? How do we get students to stay within it?
- How can the project accommodate more than just science?
- What are the "third spaces" needed to encourage collaboration?
- How do you accommodate materials and equipment necessary for instruction or research in a flexible classroom or lab?
- How is shared space operated or maintained in a transdisciplinary space?

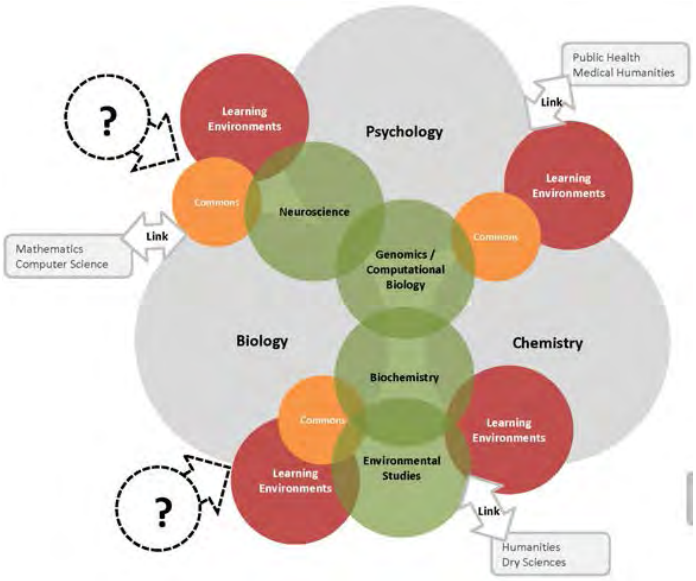


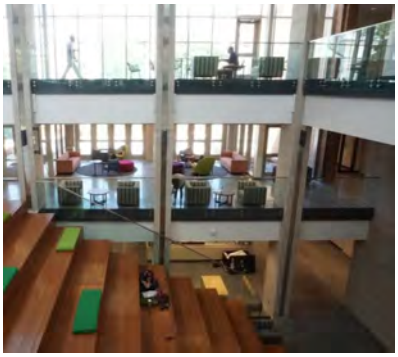
Diagram of how overlapping resources could begin sharing services

The E. Craig Wall Jr. Academic Center answers Davidson College's vision to re-imagine liberal arts education by creating an environment of learning and discovery that will expose students to the diversity of science and inspire cross-disciplinary research initiatives addressing real-world problems.

To achieve this vision, departments have been brought together into two new wings dedicated to teaching and research, with faculty offices and incubator space for cross-disciplinary research initiatives consolidated in the existing Martin Building. An open atrium acts as the nexus and point of entry for the complex with a stepped forum at its heart and providing space for open study, exhibits, and presentations to the broader academic community.

Informal collaboration and gathering spaces along circulation paths are infused throughout the complex, creating academic "neighborhoods" around which research, seminar, and group study spaces are clustered to create new synergies.

The teaching labs are active-learning environments with moveable lab benches and direct connections between labs and classrooms, allowing for a unified teaching space and accommodating a variety of teaching styles. Lab-to-lab connections allow for team-taught labs and greater potential for interdisciplinary programs.



RESOURCES & MORE

- http://pkallsc.org/assets/files/ckfinder/Davidson-College_Shepley-Bulfinch.pdf
- http://www.shepleybulfinch.com/

ENGINEERING STUDENT ACHIEVEMENT CENTER

Auburn University

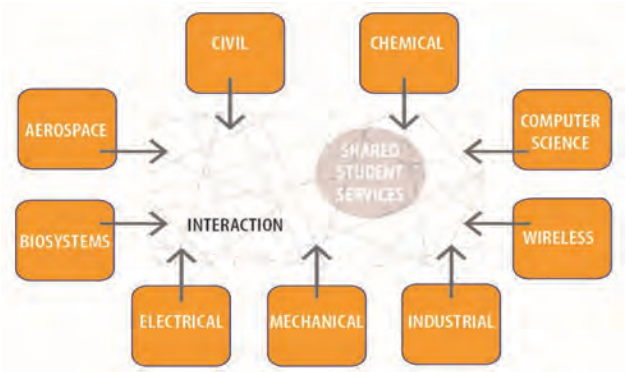
SmithGroupJJR

KEY QUESTIONS

- What does student-centered planning mean? How might we address in our planning the need for spaces that enable us to engage fully our entering and lower level students in the doing of engineering from the very first day?
- Engineering itself is a multidisciplinary community.
  - How can our planning and the spaces resulting from our planning dissolve barriers between disciplines, and build community across disciplines that is sustainable over the long-term?
- Becoming socialized into a community of STEM practitioners requires spaces where students can build and test the things they draw and design.
  - How can we introduce students to the environments where engineering is practiced in the world beyond the campus? How are such spaces different from those of past generations of spaces for educating engineers?

RESOURCES & MORE

- http://eng.auburn.edu/future/sac/
- http://www.smithgroupjjr.com/
- http://pkallsc.org/events/2016-roundtable-georgia-institute-technology



The vision for this project was borne out of the need to create a space that could better support the College of Engineering's mission to provide the best student-centered engineering experience. The College recognized that their students, particularly those with undeclared majors within the college were lacking a sense of home and it was potentially affecting retention within the College.

The examination of the problem pointed out the obvious: the College's nine departments were located in ten buildings across campus with no nucleus for college-wide student-centered functions. The recognition of these spatial dislocations provided direction to administrators and faculty to significantly transform the learning experience of Auburn's engineering students in ways that enhance their personal and professional success.

These goals built on current practice: engineering education at Auburn already extended beyond the traditional classroom; there was a high level of professional development and academic support scaffolded throughout the four undergraduate years. The vision of what an engineering student's home would look like emerged after much on-campus discussion about what kind of programs and environments are needed to realize that vision.

The primary thread woven throughout the planning was to arrive at communal sense of what student-centered planning meant: what students would be doing in the spaces, and what spaces would prompt the future success of their engineering students. For the architects, it was challenging and inspirational to have a client with such a strong vision and a great understanding of their present condition.

The resulting design is a wonderful ecosystems of spaces, with different kinds of spaces, traffic patterns, and functions that will bring together all faculty and students of the college, for the duration of the student's academic career, truly supporting a student-centered education experience, by design.

THE NEW SCHOOL UNIVERSITY CENTER

spaces that work

The New School University

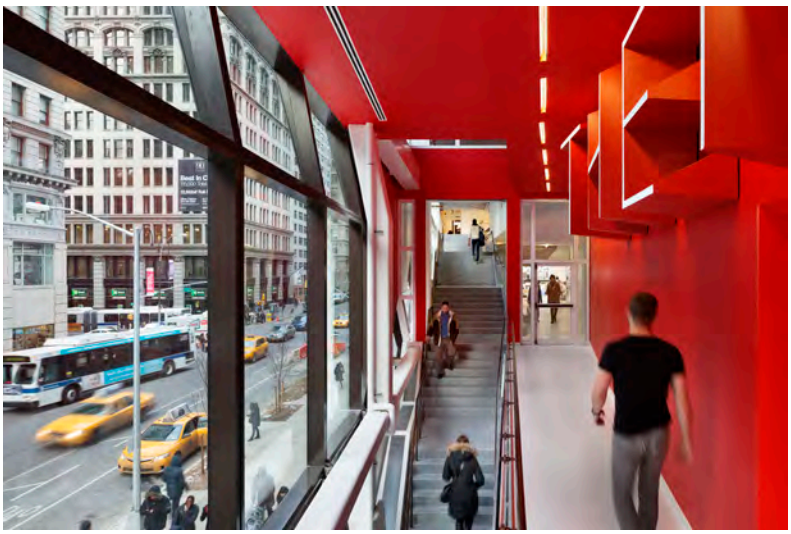
Skidmore, Owings & Merrill LLP

KEY QUESTIONS

- How do we crack open the potential of code-compliant stairways so that they functionally stitch together floors, promote curiosity in learners, and facilitate cross-disciplinary and serendipitous faculty encounters?
- How can our largest spaces (such as the auditorium) be designed to accommodate a diversity of group sizes and pedagogical and programmatic activities? How agile can a space be/become?
- How can visibility become a spatial attribute that allows maximum connectivity between our cross-disciplinary communities who work outside traditional boundaries?
- How can we capitalize on our language of spaces: spaces for making and spaces for meeting?
- How can we make every space a place for learning and provide "places of choice" for learners with diverse learning styles and needs?

RESOURCES & MORE

- https://www.newschool.edu/university-center/
- http://www.som.com/
- http://pkallsc.org/events/lsc-webinar-future-changing-context



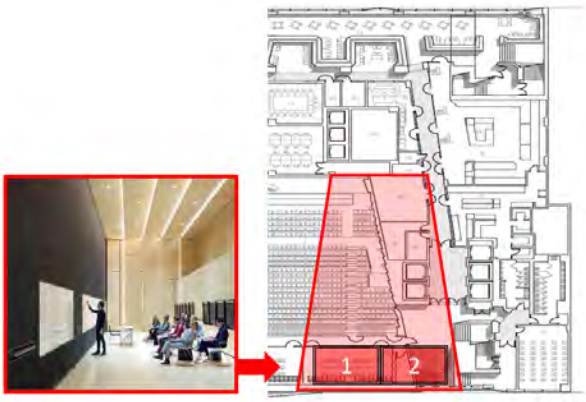
"What enlivens the design is not its bling but its emphasis on the spectacle of social interaction."

—Nicolai Ouroussoff, *The New York Times*

The new University Center, a striking embodiment of The New School's mission of challenging the status quo, provides a focal point for our downtown New York City campus.

The 16-story building, which opened in January 2014, is designed to accommodate a decade of transformation and growth in The New School's academic programs and student population. The University Center offers state-of-the-art classrooms, a library, a research center, a new auditorium, cafeteria and event café, and a 600-bed student residence hall.

All of our students will find crucial resources in the University Center, including spaces deliberately designed to promote collaborative, interdisciplinary learning—a cornerstone of the educational philosophy of The New School.



EUGENE D. SCHERMER INSTRUCTIONAL BUILDING

spaces that work

Grays Harbor College

SRG Partnership

KEY QUESTIONS

- What makes a learning space flexible, comfortable, engaging, and stimulating? Why are these intentional qualities of 21st century learning spaces?
- How does the physical setting of a new instructional building inform the planning in how it is sited and in how it relates to the larger campus master plan? Why does this matter?
- How can the language of learning and learning spaces become richer in the process of planning and in thinking about learner-centered environments, considering that an engaged learning experience is social as well as academic, interactive as well as experiential?
- What do we have to know about what faculty and students will be doing in the spaces, about what kind of environment and movement stimulates intellectual and social growth?
- How can each aspect of the building cohere around a common vision of a collection of spaces that imply and allow greater collaboration and movement across disciplinary communities?
- Can every space be a learning space?

RESOURCES & MORE

- https://www.ghc.edu/news/schermer-building-showcase-example-sustainability
- https://www.srgpartnership.com/
- http://pkallsc.org/events/2016-roundtable-university-washington

The design is inspired by the natural landscape and local timber industries of Gray Harbor. Historically, loggers used the flow of the nearby Chehalis River to transport logs from the forest to the sawmill. The design of the site draws influence from the jumbled, chaotic logjams that would develop. Attention to the history of timber also influenced the interior architectural finishes that use natural materials and textures.

The project was conceived in master plan and predesign phases as a new place for science, math and art –referred to as the SMArt building. It then mixed in an additional focus on the fields of technology and engineering resulting in a new STEAM facility.

The design also fulfills the vision of the campus master plan, which calls for a future hilltop green organized around an axis connecting to views across the Chehalis River. Rotating from a north-south orientation due to the hillside behind this site, the building also defines this spot as a bookend to the south and faces the campus gateway at the north.

A four-story tower holds faculty offices, laboratories, and studio spaces. It overlaps and interlocks with a podium—which is a partial basement engaging the hillside. The collection of spaces in the podium provides a hub for flexible interaction and common learning activities. These classrooms are arranged as "rocks in a stream," and the circulation implies movement and activity around and between these areas.

Lessons Learned:

- Make spaces that are welcoming, easy to find, and useful.
- Make spaces that are comfortable and pleasant to inhabit.
- Allow for places to experiment with new modes of providing and consuming information and material.
- Engage students with places over which they can take ownership.
- Create environments that foster interaction and collaboration.

STRAZ CENTER MODERNIZATION & EXPANSION

Carthage College

Stantec

spaces that work

KEY QUESTIONS

- How can the spaces we design blur the lines between learning that happens in the classroom and learning that happens in research labs?
- How can the spaces we design highlight and enable opportunities for students to collaborate with academic colleagues across the country, as well as with industrial and governmental partners?
- How can the spaces we are designing now encourage and enable new pedagogical practices? How can new kinds of unstructured and "pop-up" learning communities be supported in these spaces?
- How can this new building, in its siting, design, and vision, become the keystone of the eco-system for learning on this campus?
- What is the most efficient, cost-effective, and creative way to take advantage of an existing science building in shaping new spaces for science on this campus?

The Straz Center represents a new center for undergraduate learning within the Natural Sciences at Carthage College. The existing David A. Straz, Jr. Center for the Natural and Social Sciences has been renovated and expanded to create a new architectural identity for the Natural Sciences.

The project provides modern classrooms, teaching labs, undergraduate research spaces and collaborative learning environments. Collaborative spaces, common learning lounges, conference rooms and offices are oriented to take advantage of natural light and lake views. A new planetarium features and is architecturally expressed along the west façade to create a new "street address" for the Natural Sciences along Campus Drive.

The Straz Center Modernization + Expansion project renovated 42,179 net square feet of space and constructed an additional 28,119 net square feet of new building. Overall, the project includes 102,855 gross square feet of building area. Construction of the project was phased according a schedule determined by the College.

The David A. Straz, Jr. Center for the Natural and Social Sciences is functionally the south end of a larger complex of connected structures including the Clausen Center for World business and the existing Theater directly to the north. The new addition to the existing facility and renovation work within the existing David A. Straz, Jr. Center for the Natural and Social Sciences is limited to the north by the existing south wall of the Theater. No new work is to be performed north of this existing dividing wall. The site for the Straz Center Modernization Project is bounded on the west by Campus Drive, to the east by the shore line of Lake Michigan and to the south by existing Lentz Hall.

RESOURCES & MORE

- https://www.carthage.edu/about/facilities/straz-center/
- https://www.stantec.com/en
- http://pkallsc.org/events/2016-roundtable-boston-university

DIGITAL CLASSROOM BUILDING

Washington State University

Vantage Technology Consulting Group

spaces that work

KEY QUESTIONS

- How can an institution without a history of planning spaces take a major leap into the world of planning modern classrooms that serve 21st century institutional goals?
- How can a campus create common ground for discussions about what student success means for the community and what improved learning would look like?
- How can a campus imagine and realize a digital classroom that enables communal storytelling, facilitated discovery, and a shared experience of learning?
- How can a major classroom building be designed to serve as a bridge between the academic world and the world beyond the campus?
- How can the process of planning mitigate the potential of incorporating technologies that are not needed or that quickly become outdated?
- How do you plan a space that can continue to grow and adapt to changing technologies, students, and faculty?
- How are emerging trends of technology influencing how 21st century classrooms are being planned and how they will be planned in the future?

ABOUT THE PROJECT

Washington State University's campus-wide initiative to address tremendous advances in understanding how 21st century students learn was a driver for planning a new digital classroom building that would serve as a gateway to the world, be a showcase venue, and to catalyze their initiative.

Campus leaders and the designers focused first on the "why" of the spaces to be designed. Beginning with "why" was seen as more important than focusing on "what," because "what" most often generated merely a laundry list of interesting spaces.

The role of the designers was to nurture discussions about technologies that then turned into discussions about the future to consider how technologies serve institutional goals for learning and teaching over time. All understood that this project (as a showcase venue) offered the institution a pathway to innovation.

The most visible innovation in this design is an in-the-round active-learning lecture hall with circular, blended video displays viewable from any seat in the room. This hall is surrounded by flexible classrooms, some of which are large and others of which are pedagogy-specific. This classroom building also nurtures the culture of innovation with purpose built areas, including spaces where all members of the campus community can gain digital learning skills and spaces for faculty innovation.

This project was an opportunity for the campus community to step back and consider how the lifespan of technology and the continuing pursuit of learning innovation is at odds with the long lifecycle of physical buildings and the traditional "once-and-done" culture of academic building design and construction.

RESOURCES & MORE

- http://www.vantagetcg.com/
- http://pkallsc.org/events/2016-roundtable-georgia-institute-technology

ROLLINS CAMPUS CENTER & LIBRARY

Young Harris College

VMDO Architects

spaces that work

KEY QUESTIONS

- What are the beneficial impacts/ synergies of blending library and campus center programs?
- Can a mixed-use building save money and space by capitalizing on those impacts/ synergies?
- Do these programmatic overlaps intensify the use of the building? Is there increased use of the library by diverse groups?
- Can learning spaces be shared effectively between departments and programs?
- What is the right balance of food and social space to animate learning spaces?
- Do adjacent outdoor terraces and porches really enhance learning spaces in temperate climates?

The Campus Center connects four distinct areas: a 60,000 square foot multipurpose student center; an expanded dining hall boasting a wide variety of food stations; a 350-seat, versatile event facility; and a 40,000 square foot library and learning commons.

When it comes to spaces for informal social gathering and study, the modern campus library, student union, and dining hall all share remarkable similarities. Each building promotes interaction and collaboration in a variety of settings and encourages students to meet, interact, and learn, all with access to technology while being flexible, adaptable, and responsive to rapidly changing digital resources.

Co-locating and cross-training library, campus life, and student development staff brings program synergy to life. This overlap translates into a more efficient building—with fewer spaces than if built separately—concentrating and amplifying the sense of activity around learning outside of the classroom. In fact, the number of students using the library has increased by nearly 80 percent since the Campus Center opened.

The planning process brought together a cross-section of the community including an engaged faculty and a diverse group of student leaders and learners. The design team fabricated programmatic "game pieces" to use in a series of hands-on exercises—especially designed to find the overlaps and synergies between uses—which led to a series of combined active classroom and group study spaces shared by both the Campus Center and the library.

This approach led to an innovative solution where the 24-hour zone of the library feeds off of the Campus Commons with the bistro platform of the dining hall available for afterhours use. Two academic meeting rooms are strategically located off of the upper commons for open and easy access by faculty and students.

RESOURCES & MORE

- https://www.yhc.edu/student-life/rcc
- https://www.vmdo.com/
- http://pkallsc.org/events/2016-roundtable-boston-university

ENGINEERING PRODUCT INNOVATION CENTER (EPIC)

Boston University

Wilson Architects

spaces that work

KEY QUESTIONS

- How can we take better advantage of distributed, underutilized campus spaces?
- How can we showcase STEM programs at work?
- How can we make industry partnerships work to our advantage?
- How can we attract the next generation of STEM students?
- How can we plan for future flexibility while managing a limited budget?
- How can a single space be shared among multiple stakeholders and program roles?

The Engineering Product Innovation Center (EPIC) is a new engineering curriculum at Boston University that emphasizes a hands-on approach to product design and trains students in the process of bringing new products to the marketplace. The program consists of a reorganization of engineering and maker tool sets, assembly areas, classrooms, and research labs from disparate locations across Boston University's campus into 20,000 SF of revitalized storefront along Commonwealth Avenue.

Planning for EPIC occurred in several distinct steps. In 2010, a comprehensive space needs assessment for the College of Engineering (COE) identified available space. The site of the vacant Guitar Center storefront at 750 Commonwealth Ave was chosen for its prominent location, high volume of pedestrian traffic, and ease of vehicular and mass transit access.

A Basis of Design program was created that included consolidated machine tools, shared assembly areas, a materials testing lab, foundry, wood shop, and classrooms. Test fits and program efficiencies were developed to provide a clear understanding of both cost and space needs.

EPIC was born out necessity, but took on a life of its own. The COE proactively engaged local industries to help defray renovation costs, retool the curriculum and provide students with relevant skills. EPIC is a pioneering facility that helps address a critical need in the US: the training of prospective engineers who understand how to develop and manufacture innovative new products.

The COE's top priority— to bring Engineering to the forefront of BU's main campus— was realized. The design delivers EPIC as a prominent gateway to the central campus as students cross from west to east across the BU Bridge. EPIC is not only visible, but transparent. Since the facility opened, the level of student engagement and interest in EPIC has grown to accommodate 750 students per semester.

A large expanse of glass along Commonwealth Avenue puts the engineering program "on display" and affords pedestrian traffic a view into the space. The once anonymous and obsolete building now serves as a gateway presence at the heart of BU's campus.

RESOURCES & MORE

- http://www.bu.edu/eng/current-students/epic/
- https://www.wilsonarch.com/
- http://pkallsc.org/events/2016-roundtable-boston-university

NANOENGINEERING AND SCIENCES BUILDING + MOLECULAR ENGINEERING AND SCIENCES BUILDING

spaces that work

University of Washington

ZGF Architects LLP

KEY QUESTIONS

- How would the design of these classrooms accommodate the flexibility needed to meet the needs of different pedagogical models?
- How could the classrooms' design allow both enough specificity and enough flexibility to serve as either general-use classrooms or learning lab spaces?
- How will adjacencies support learning?
- How will furniture be used to work in conjunction with technology to support effortless transitions between modes of learning?
- How do we design spaces that not only support but also suggest different modes of collaboration?

The University of Washington (UW) Nano Engineering and Sciences Building (NanoES), completed in July 2017, is the second phase of the 168,000 square foot research complex that connects to the UW Molecular Engineering and Sciences Building, completed in 2012. UW NanoES includes research laboratories and two active-learning classrooms — one large and one small.

The smaller of the two classrooms serves as a test-bed laboratory used by the UW's Clean Energy Institute, fulfilling the vision of a transparent, science-on-display concept. As students test ideas, their work is visible to passersby both outside the building (from the prominent Stevens Way arterial) and inside via view windows. The larger classroom can be reserved by departments across campus, promoting interdisciplinary collaboration.

Together, the spaces advance the "flipped classroom" concept, wherein students face and learn from the professor, and then "flip" their chairs to easily work with one another. As the furniture is not fixed, the large classroom can also be reconfigured to provide a seminar setting of around 90 seats. Movable furniture, such as the half-hexagonal tables used in the classrooms, are ideal for collaborative learning because they can be rearranged into multiple shapes and become a physical expression of flexibility.

The third space on UW NanoES's first floor (shown in the photos) is a shared classroom auxiliary break-out space, providing opportunities to prepare and/or continue to develop the ideas shared and advanced in the classroom. The space also hosts UW Department of Engineering events, further promoting idea sharing.

RESOURCES & MORE

- https://www.engr.washington.edu/about/bldgs/nanoresearch
- https://www.engr.washington.edu/about/bldgs/mol
- https://www.zgf.com/
- http://pkallsc.org/events/2016-roundtable-university-washington