spaces that work

spaces that work Collection III:
# Snapshots of Spaces that Anticipate the Future

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The library is everywhere.

The university library, which in many ways has become the modern-day agora of campus, provides a case study in renewal and realignment for other programmatic spaces that will need reenvisioning in the post-COVID physical campus. Hayden Library Reinvention at Arizona State University transforms a place for books into a place for people, reflecting the diversity, history, and scholarship of the university. The proliferation of digital technologies has changed how information is discovered, used, and shared. Since the turn of the century, the library has adapted to service the changing needs of research, teaching, and learning. As planners, we were required to reconsider the role of the library in the university ecosystem.

What can we learn from this process, that can now inform other spaces on campus? **The physical campus is transforming from a collection of buildings used for static, scheduled, and segmented curriculum to a network of interactive spaces focused on the creation, application, and academic integration.** We see a shift in space priorities from curricular to co-curricular spaces, from segmented and singular research to flexible research spaces that allow students to participate in the process, and from buildings that separate faculty from students to places that encourage them to come together. Libraries are now 24-7 hubs of activity – they are diverse, versatile, and malleable spaces for learning and making. In an environment of higher education that offers both digital and physical space, what physical spaces does the campus need to welcome students, support their education journeys, and facilitate their success? And what lessons can we take from the library's reinvention to move us forward into the next normal of campus planning and design?
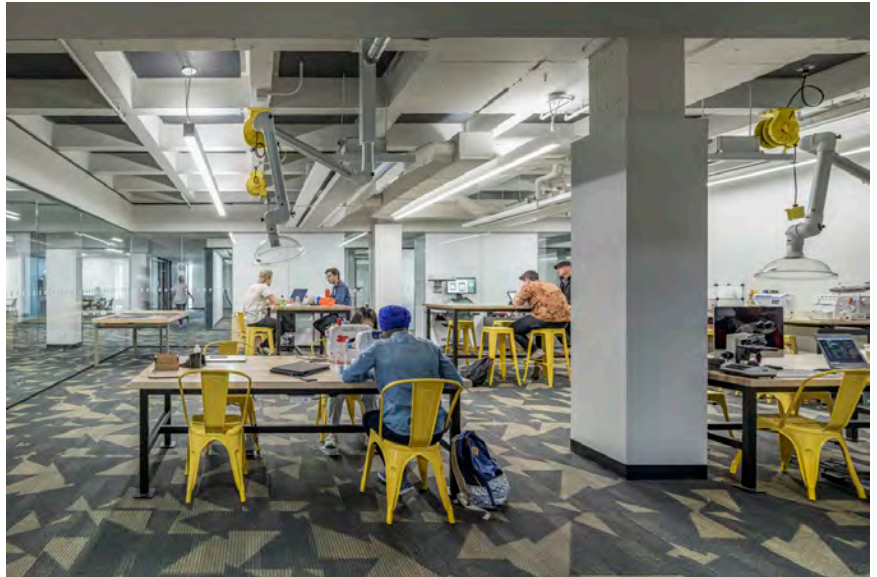
Hayden Library Reinvention enhances student space and elevates library resources for a 21st century learning landscape.

HAYDEN LIBRARY REINVENTION
**Arizona State University**

AYERS SAINT GROSS

BUILDING A LEARNING COMMUNITY OUTSIDE OF THE CLASSROOM.

Providing a wide variety of community-life and informal learning spaces offers students, faculty and staff a support system to build their lifelong learning community. These programmed in-between spaces, centering gathering spaces and casual touchdown spaces outside of the classroom create opportunities for connection, support chance interaction and foster communal equity.

"In-between" spaces are essential. While traditional academic buildings are characterized by their structured, formal spaces for learning, contemporary research acknowledges that much learning occurs in unstructured, informal settings. These "in-between" spaces – cafes, lounges, small group rooms, study halls, exercise rooms, corridors – create integral opportunities for social convergences and informal connections, ultimately giving meaning and vitality to the buildings and to the communities that inhabit them.

Create a "center". While promoting the physical, communal expression of an institution and its programs, architecture must also create a home and "center" for students, faculty and staff. Accessible multi-purpose spaces such as forums and atriums organize and connect programmatic spaces with social spaces, creating a building "heart" that supports student and faculty academic life, community and culture, and fosters communal equity and individual access.
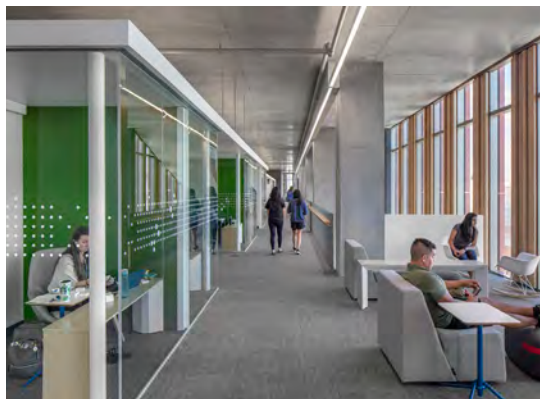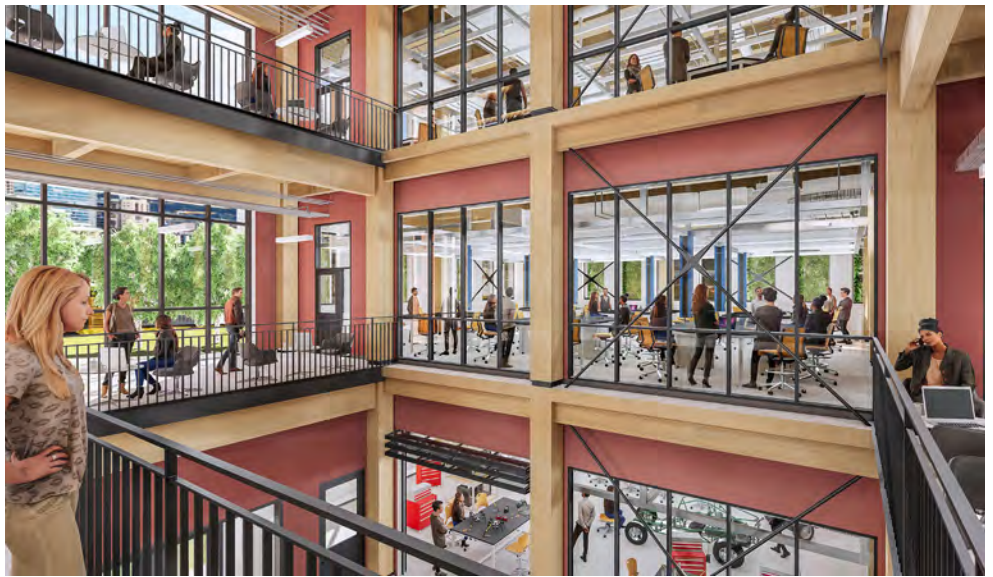

Provide "offshoots" of streams. Within the spectrum of community, nooks and eddies that flank larger public armatures provide students and faculty a place to feel alone and together at the same time. Alcoves off of main circulation paths, seating pods integrated into staircases and touchdown areas in highly trafficked spaces provide breakout opportunities for either casual integration or focused concentration within the broader building community.

CO ARCHITECTS

STEM Learning Facility and Shaw Lane Power Plant Renovation

Michigan State University

Overall view, with renovated Power Plant in center, new STEM additions to right and left

First Floor Plan, former Power Plant in center, STEM additions to right and left

STEM North Addition   Existing Power Plant   STEM South Addition

Flexible Project Lab, with overhead service grid

- 10 x 10 Overhead Service Grid
- Movable Service Drop
- Movable Student Tables
- Fixed Casework and Equipment
- Double Module Lab with Demountable Teaching Wall

Diagram showing components of the overhead service grid

Atrium at entry, showing Cross-Laminated Timber (CLT) structural frame

The STEM Learning Facility and Shaw Lane Power Plant Renovation combines 120,000 square feet of new construction for STEM teaching labs, 40,000 square feet of renovation for MSU's Center for Innovation in Learning and various student support spaces, and a new learning space addition of 16,000 square feet. Completion date: Spring 2021.

The goal of the project is to create an integrated learning center that brings together several distinct components:

1. new, highly flexible STEM learning labs intended to serve a variety of disciplines, including Chemistry, Computer Science, Biology, Materials Science, and Physics

2. flexible, open-ended project labs, intended to support future learning initiatives, student projects, and new interdisciplinary courses

3. a Student Commons

4. Hub for Innovation in Learning and Technology (MSU's Learning Innovation Center)

5. a Student Help Center

6. student studio space, for student project work

The combination of STEM learning spaces with various spaces for new learning initiatives is intended to create an integrated learning center with a focus on continual innovation.

The new STEM learning spaces were designed with an innovative new curriculum, building on team-based, active-learning initiatives. Each space is equipped with a cutting-edge technology infrastructure to allow the easy reconfiguration of lab tables. The spaces can also be re-configured for a variety of disciplines over time.

The mission of the Hub is to create, identify, and accelerate new ways to collaborate, learn, research, and deliver instruction at Michigan State, and the project seeks to integrate these aspirations into the culture of the overall STEM learning complex. Combined with the Student Help Center and Student Project Labs, these components integrate with the STEM learning spaces to create a multi-faceted and dynamic center for student learning.

CREDITS

Ellenzweig is serving as overall Design Architect and STEM Lab Programmer/Planner.

IDS is serving as Architect-of-Record and Design Architect for the Shaw Lane Power Plant Renovation.
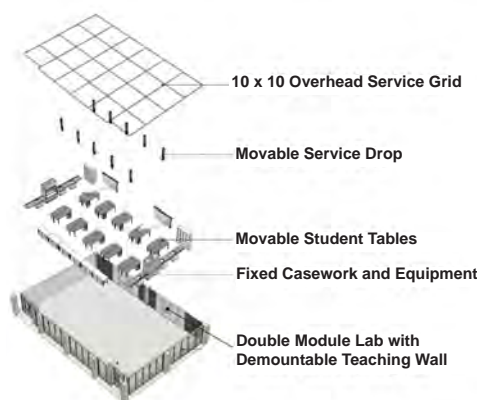
EWING COLE

INCLUSIVITY WITHIN THE U.S. MILITARY ACADEMY
CYBER & ENGINEERING ACADEMIC CENTER - WEST POINT, NY

ARCHITECT:
Jacobs / EwingCole - Joint Venture
Lab Consultant: EwingCole

PROGRAM:
Provide innovative labs for Civil & Mechanical Engineering (CME), Electrical Engineering & Computer Science (EECS) and Systems Engineering (SE) + 450 Car Parking Structure + Bridge and Conference Center

DATA:
136,000 Gross Square Feet
82,600 Net Square Feet

BOTTOM LINE:
"The bottom line is that CEAC will directly support General Milley's (Army's 39th Chief of Staff) vision of a technically competent force that can tackle complex problems."

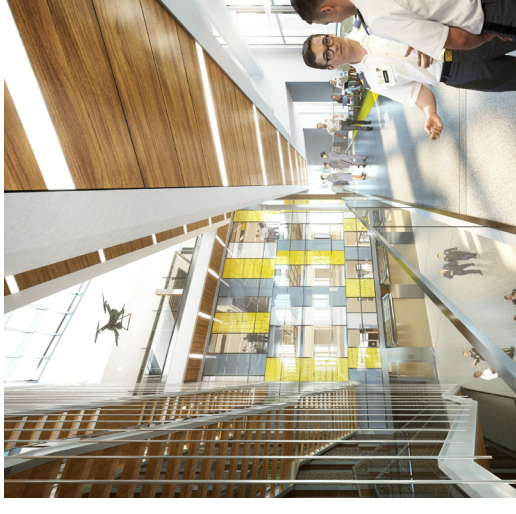Dr. Led Klosky, PE, Dean's Executive Agent for Design and Construction

INTENDED OUTCOMES:
- In response to rapidly changing technology in the modern world, on the battlefield, and throughout the Army at large, CEAC will reflect West Point's growing leadership in the development and application of STEM-based solutions to the most difficult global challenges
- CEAC will enable and inspire the kinds of collaboration across disciplines that simply cannot happen now in the current academic spaces
- It will prepare cadets to confront the increasingly technological challenges of peacekeeping and defense
- Emphasizes shared technology and collaboration for advanced problem-solving
- Incorporates shared maker spaces, labs, & capstones to create an environment of interdisciplinary engineering
- Maximizes efficiency and flexibility in planning
- Will help to recruit the "best of the best" to join USMA

GOALS AND OBJECTIVES:
- Develop a facility that is state-of-the-art, cutting edge, and inspirational
- Create a building that contextually integrates into the campus
- Provide an efficient layout based on the proposed program and adjacency requirements
- Develop a floor plan that promotes collaborative academic opportunities between cadets, cadets and faculty, and between the 3 departments of CME, EECS, & SE

PROJECT VISION:
- Strengthening the quality of STEM education at the Academy
- Attracting STEM talent for West Point, the Army, and the nation
- Integrating STEM knowledge and skills across fields
- Enabling cadets, faculty, industry partners, and military leaders to quickly synthesize and share massive quantities of data, test prototypes, strategize STEM innovations, and evaluate ethical considerations

JACOBS / EWINGCOLE A Joint Venture

CYBER SECURITY - Multiple digital connections allows for cyber warfare amongst cadets
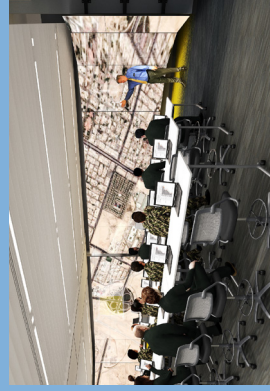
SYSTEMS DESIGN - Digital planning by collaborating with massive amounts of data

HIGH BAY - Inviting creativity and risk-taking for developing future inventions for the Army
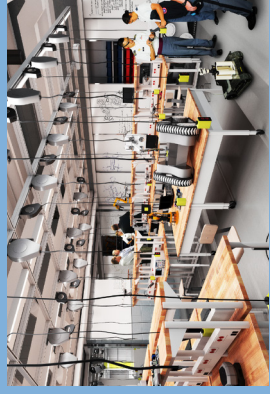
**ROBOTICS** - Interdisciplinary effort - civil, mechanical, electrical & computer science

TESTING LAB - Developing devices to replace direct human interaction on the battlefield

Universities are a collection of academic communities creating opportunities for human connection to specialized groups and an incubator for ideas. The campus has traditionally been the container for those communities.

Understanding how the campus plan and the built environment can enhance community is paramount in the post-Covid world. The container is changing to include students and faculty who are teaching or learning remotely. Traditional spaces on campus are being re-purposed and re-imagined for uses never originally intended.

Studying what creates inclusive and equitable community; going beyond physical location, is critical to getting it right going forward. Community is experienced; one must have a sense of belonging for community to thrive. The question becomes how to foster community in both physical and remote locations at the same time so that the group feels equally included from either?
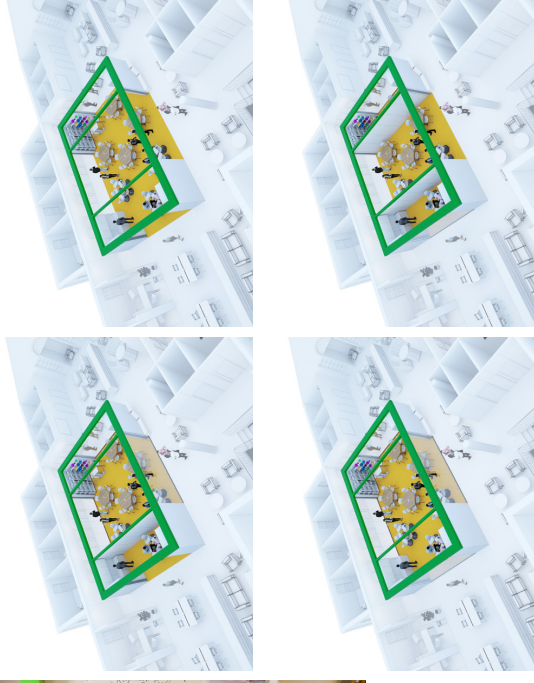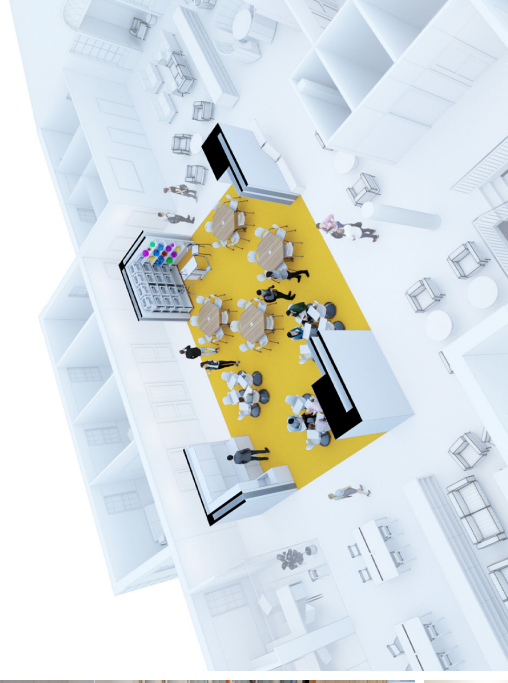
Flexible Classroom Prototype

*Space as a 'Swiss Army Knife'

In the age of rapidly developing technology nearly all academic spaces should be designed with intentionality, simplicity, durability, flexibility and visibility in mind and as the primary design drivers and objectives. By focusing on these design criteria, **spaces are able to** not only encourage constant use/activation by putting "learning on display", they are also able to then **work as a 'Swiss Army Knife'** of sorts and become easily adaptable over time to changing equipment and pedagogical needs as they arise.

By embracing hyper-flexibility in academic buildings, institutions are oftentimes able to reduce "actual programmatic square footage" while focusing on higher quality spaces and greatly increasing the actual use of such spaces as many of these can be used to satisfy multiple programmatic needs. When utilizing these strategies properly, a single academic building can serve a multitude of functions and programs such as classrooms and labs 8 hrs/day, coworking and group study space 8 hrs/day, performance space and making 8 hrs/day, etc. therefore maximizing space utilization and become a true 24-hour building.

Through this "Swiss Army Knife" approach, any such building will have significantly more usefulness to a much broader university population in addition to cutting down on site, landscape and sustainability implications while also allowing for unique opportunities for serendipitous collaborations to occur between people from dissimilar backgrounds and academic programs, therefore strengthening an institution's overall propensity for innovation and academic advancement.

Some of the possibilities to configure the space

CLOSED

OPEN

HANBURY

Historic Nomadism Paves a Path to the College Campus of the Future

Historic nomadic communities in Central Asia were at home on the move and where they hitched their horses. Today's students, faculty and staff are the modern nomads. They are at home where they log in. Mobile tech devices are *their* horses.

Therefore, reimagine the college campus as a network of flexible learning and gathering places that a community of nomads feels are *their* homes. At any moment "home" could be a classroom, lab, cafe, hallway, library nook, assembly hall or bench under a tree. The interconnected "homes"on such a campus activates a community of hunters, gatherers, and traders of knowledge, ideas and skills. On this ideal campus, as in the hospitable yurts of Central Asia, any newcomer is welcomed as an honored guest.

The architectural manifestations of nomadism in today's higher education domain will be sustainable transformations of current sites and structures into modest but distinctly majestic places, forming lasting value and values.

Our design for the **American University of Central Asia** (AUCA) in Bishkek, Kyrgyzstan offers daily homes for a nomadic generation of 21st century learners. Unlike more sprawling liberal arts college campuses, open and flexible spaces at AUCA are tightly woven into one building and one quad bringing the entire community together in full sight. Interconnected spaces activate interdisciplinary learning and chance encounters. The building is a nomad's on site browser.

The furniture is nomadic, too. Tables, screens and shelves are on wheels, an invitation to rearrange as needed and desired. Regional commercial and creative organizations are welcomed guests to gather and exhibit on campus, engaging students. As nomads thrive on what the earth offers at their feet, AUCA boasts its region's first geothermal heating and cooling system. The local standard concrete structure is not filled with blank walls and long corridors typical with the prevailing Soviet style but rather is exposed as an open framework for a nomad's vista.

HMA²
architects

Healthy Learning

The immediate physical and cultural shift experienced in 2020 has challenged the notion of the traditional on college campus learning experience. We don't yet know the long term effects of a year of virtual learning, but we can expect some form of online learning is here to stay. As we continue to study engagement and outcomes of the virtual learning environment, institutions should pay close attention to space on campus that does not support optimal learning.

Cognitive research shows when we're dissatisfied with the physical environment our executive functioning skills are impacted. Access to natural light, biophilia and exposure to off gassing materials have the biggest impact on our cognitive abilities. Studies at the University of Syracuse show an increase in natural ventilation and a reduction in VOC exposure can improve test performance by 101%.

As Universities and institutions increasingly adopt a hybrid-learning policy on campus learning spaces need to not only facilitate learning but increase student performance. The team at HOK has developed strategies for Healthy Learning Environments at Morgan State University, Emory University and George Washington University. Now more then ever, we realize design needs to consider the long term strategy around student health and wellness.

Inclusive Learning Environments in an Era of Disruptions

According to The Derek Bok Center for Teaching and Learning at Harvard University, **"inclusive teaching involves cultivating awareness of the dynamics that shape classroom experiences and impact learning. It also involves being responsive to these dynamics and intentional about using strategies, or inclusive moves, that foster a productive learning environment."**

A multi-pronged approach of leveraging emerging learning technology, continual and personalized assessment, and mentoring, along with the power of design, can have a profound effect on learning. Inclusive design strategies themselves must be purposeful, meaning a focus on both physical and emotional conditions. We need to deliberately create spaces that encourage a feeling of belonging for all.
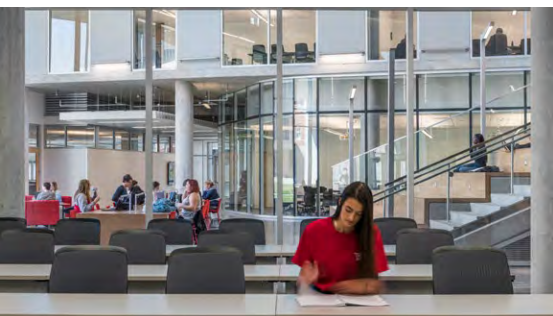
University of Cincinnati, Health Sciences Building

—— 01
Visibility

Visually connecting formal and informal learning spaces and activities can stimulate awareness and increase participation. How a classroom is configured can help set a tone for an inclusive and welcoming learning environment. It signals to students whether the environment will promote active involvement, emphasize collaboration with peers, create a sense of proximity to the instructor or emphasis to a learner to focus on heads down tasks and rely on one-directional information flow.

University of North Dakota, School of Medicine and Health Sciences

—— 02
Technology

Faculty have been inspired by technology-equipping active learning classrooms to broaden participation and build communication skills. Multiple small-group monitors and supporting technology give the option to less-assured students, including underrepresented, often first-generation college students, to initially post responses to questions on the monitors before responding verbally. This method can serve to build confidence and equalize support for students from all backgrounds to participate and succeed.

Clemson University, Watt Family Innovation Center

—— 03
Flexibility

Flexible classroom environments, where students are encouraged to sit in tables grouped together, utilize writable wall surfaces to share ideas, and engage with multiple screens, promotes team problem solving, critical thinking, and it sharpens collaboration skills. These environments teach students to make connections between ideas and evaluate information critically. As the requirements of students change, and learning patterns evolve, spaces should grow and adapt as well.

—— Looking Ahead

A significant design opportunity will be adapting learning environments for versatility so a variety of activities—collaboration, individual work, mentoring, access to resources including staff and faculty, presentations, instruction, interaction—can occur in a single space. More versatile learning environments will more effectively meet diverse student needs promoting equity and inclusion within the campus community.

Perkins&Will

Learning Spaces Still Matter

Michael B. Enzi STEM Undergraduate Laboratory Facility
University of Wyoming
Laramie, Wyoming

As colleges & universities struggle to continue providing hands-on, engaged learning opportunities for students, particularly students in STEM, different combinations of hybrid and virtual pedagogies are being implemented. The relative efficacy of these different methodologies will take time to assess, but anecdotal evidence already indicates that many students are craving the social aspects inherent with in-person on-campus learning opportunities that have been missing for most of 2020. In our work with clients throughout the U.S., we are finding increased interest in providing spaces that are flexible in terms of day-to-day use, adaptable to support long-term changing needs, and with features that enable students in STEM laboratories and classrooms to have the highest quality learning experience.

The Michael B. Enzi STEM Facility at the University of Wyoming offers a wide range of formal and informal spaces providing choices for student and faculty engagement before, during and after class / laboratory periods. The photos below provide visual evidence of the success of these spaces in creating an active and collaborative STEM learning community that is difficult to replicate online.

Ample break-out spaces provide options for both individual study and student interaction / collaboration

Open alcoves with white board and flat panel monitors encourage informal peer learning opportunities

Central atrium forms the 'heart' of the building giving students choices of seating, tables and study amenities

Students teams collaborate in 'hands on' experimental activities in an Organic Chemistry Laboratory

Adjacent visible Lab Support Space gives students the opportunity to use advanced instrumentation in person

Adjacent Computer Room for data analysis with direct visibility / monitoring from the Chemistry Laboratory

Collaborative teams working on Physics experiments adjacent to Computer Room with folding glass wall

Folding glass partition allows student to work back and forth between experimental and computational tasks

'Hands on' experimental teams enjoy working together in-person with appropriate safety protocols

RFD

RESEARCH FACILITIES DESIGN | Laboratory Design Consultants | *We have laboratory planning down to a science.*

Design Ideas for Taking Learning Outside

There is much that we do not yet know about the impacts to learning spaces as an outcome of our current moment. But what we do know is that indoor environments with poor ventilation place occupants at increased risk now and for the duration of this pandemic, and, as a result, that new modes of online instruction and e-learning are serving as a safe venue for students and faculty alike. We also know that taking socially-distanced activities outdoors may provide the benefit of a lower risk environment. At SOM, we question if there are ways to adapt insular learning environments to be more permeable to the outdoors for the benefit of students and faculty. How might we deploy new strategies at a variety of scales that result in exterior learning settings which are surrounded by nature (in lieu of 4 walls)?

A Permeable & Porous Vertical Campus
Scale: Building Massing
Urban campuses working with small footprints might consider more open and porous access to the outdoors – be it through operable windows or accessible terraces and green roofs. *Pictured: Barnard College - The Milstein Center (SOM)*

Open Campus Network
Scale: In-Between Buildings
Campuses that rely on partnerships might consider how a network of outdoor spaces can draw people to collaborate beyond the walls of a building – leveraging the spaces between buildings and landscape to serve as outdoor classrooms, meeting areas, and areas for wellness and recreation. *Pictured: Cornell Tech Campus (SOM/JCFO)*

Extending the Program Outdoors
Scale: Campus
Campuses in rural settings might consider leveraging the natural environment for learning opportunities – be it through working landscapes, experimental gardens, field research or data gathering in ecological settings. *Pictured: Wellesley College Science Center (SOM)*


Lifting Barriers to the Exterior
Scale: Building Facade
Campuses in warmer climates might consider operable facades to bring in the outdoors, and support natural ventilation while encouraging learning activities outside (de-densifying the indoors). This kind of flexibility on campus might be supported by operable garage doors, foldable partitioning, and open pavilions. *Pictured: UC Merced Campus (SOM)*


SOM
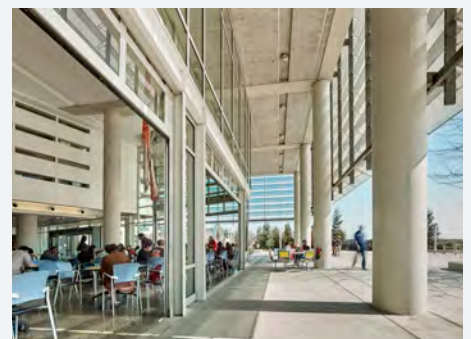
Education in the Ecotone

Integrating educational disciplines is usually approached programmatically first, and physically second. The result is synthetic, for as crossovers develop spontaneously, programs do not. Instead of searching within disciplines for connections, institutions should be focusing on the existing spaces between them. Each discipline is its own ecosystem, knowledge from one cannot thrive in the middle of another, but along the borders natural diffusion will occur given the right conditions.

At Bucknell University, the New Academic Quadrangle acts as a physical and metaphorical 'ecotone' between STEM and the humanities. At this intersection of design and educational philosophy, Bucknell has optimized the conditions to facilitate natural integration and academic synergy.

The relationships between interior and exterior public space, classroom and laboratory, were designed for fluid interaction of users. The exterior court and main level functions of each building act as a conduit for multiple streams of interaction. The vision for Bucknell was to create an interdisciplinary, collaborative, biophilic learning environment through the interconnections of educational, research and communal spaces, both inside and out, this goal is achieved.

Stantec
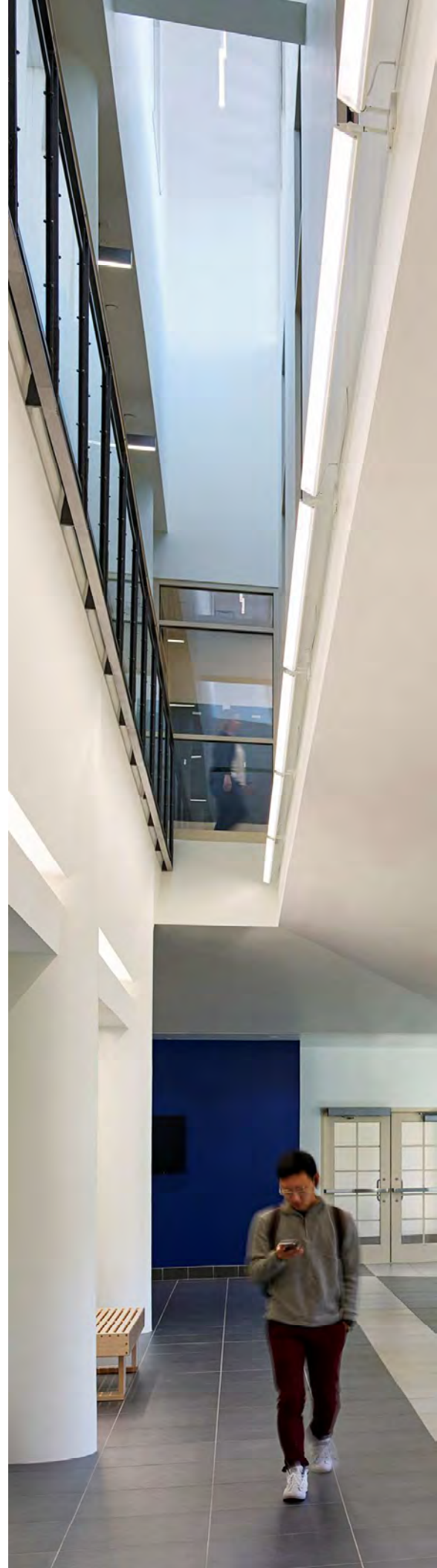
Creating a New Discourse around the Arts and Technology at Virginia Tech

Virginia Tech's Creativity and Innovation District (CID) proposes a transdisciplinary nexus that draws students, faculty, and external partners together from a broad range of disciplines to create a new discourse around the arts and technology. Providing facilities, resources, tools, and technologies that enable this district to thrive, the CID residence hall serves as a cross-cutting living-learning community (LLC) that encourages residents to collaborate in uncommon ways that blur boundaries and disciplines.

Informed by Virginia Tech's Beyond Boundaries Master Plan, three key goals were embedded in the design of this signature destination for interdisciplinary collaboration on campus: **Invest in people and partnerships; Create campus collisions; and Express institutional missions.**

VMDO