

BACK TO SCHOOL

THE EVOLUTION OF ACADEMIC LABORATORY



Burke Chemistry Building, Dartmouth College

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September 2025 — Science and Innovation Principal Edwin Hargrave is currently leading multiple research projects at Dartmouth College as part of our Higher Ed sector work. One project particularly stands out: a renovation in Burke Chemistry, a research facility that Edwin was a key designer for approximately thirty years prior, earlier in his career. We sat down with Edwin to hear his thoughts on returning to work in the building.

BURKE LABORATORY WAS CONSTRUCTED IN 1994; WHAT WERE THE STATE-OF-THE-ART CONSIDERATIONS WHEN YOU WERE DESIGNING THE FACILITY?

At the time, Academic Science facilities were coming into their own, both as a vital component of cross-disciplinary curriculums and as an opportunity for

unique architectural expressions.

Historically, science facilities followed the planning conventions and exterior expressions of a traditional classroom building. This was relatively easy to accomplish stylistically and technically, since the sizes and arrangements of program spaces were similar. MEP systems were also relatively simple in those buildings, which had not yet caught up with the risks associated with exposure to chemicals. In the late 80's, science buildings began to adopt a highly industrial expression, in part to celebrate the technical sophistication of the building's mechanical systems, not unlike the Pompidou Centre in Paris. While these were dramatic to see, they were typically not great

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neighbors visually and not well poised to stand the test of time – a critical consideration when working on an established legacy institution's campus.

With Burke, we wanted a friendlier approach that respected the overall campus aesthetic while also speaking to the vernacular of the region and subtly hinting at the complexity of the technology within. The building is sited just off the campus green and embraces the pedestrian pathways with a landscaped forecourt and a generous entrance porch with bench seating. The exterior of the building has materials that match the nearby campus buildings – a warm brick blend with New Hampshire granite accents – and emulates the proportions of the windows, doors, and similar exterior elements. We also employed a sloping metal roof reminiscent of large vernacular structures and sculpted the profile of the roof form to express and integrate the many laboratory exhaust “chimneys” occurring in the mechanical penthouse. We collectively chose to focus the design attention and capital on the teaching and research programs and state-of-the-art MEP systems specifically tailored to the needs of the facility but also easily serviceable.

As is often the case with new buildings on significant campuses, the building garnered much attention in the architectural community once completed. While this was certainly rewarding at the time, the fact that the building is still considered to be a good neighbor today – and continues to accommodate emerging programs easily – offers an even more lasting sense of satisfaction.

WHAT WERE THE DESIGN INNOVATIONS INTRODUCED IN BURKE?

Lab safety was a significant design driver for Burke, and we focused attention accordingly in all the program spaces. In the research labs, Burke was one of the first projects to physically separate grad student write-up areas from the lab spaces. At the time, write-up desks were typically attached to the lab benches, or just across a narrow “ghost aisle” but still in the labs. This provides unnecessary exposure to risks to the students in the labs while they're not performing true research activities. In Burke, the write-ups are grouped in a separate collaboration space, which is nestled between the research labs and connected with large glass windows into the lab spaces. This is a practice TRIA continues to this day, especially with renovation and consolidation projects that seek to increase the efficiency and utilization of valuable research square footage in addition to ensuring safety.

The research labs are provided with Lab Safety Panels in the entry vestibules, another innovation. The Safety Panel co-locates all life safety features into a door-sized piece of millwork where they can be easily accessed – this includes an extinguisher, emergency shutoff switches for electrical and flammable lab gases, MSDS Sheets and signage for chemicals in use, a campus phone (yes, a plastic corded telephone) connected to emergency services, and of course lab coats and eyewear. This was in many ways the precursor to what's now known as the PPE Station (personal protective equipment) found in most research laboratory entrance vestibules.

Burke's teaching labs also included a major safety innovation in the form

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of the first all-glass student teaching fume hoods. High visibility between the instructor and the students is key to preventing accidents with introductory chemistry courses, and the glass-walled hoods provided views from the instructor's station across the entire lab. These are now a mainstay in most laboratory equipment manufacturers' offerings, and by comparison they're now certainly more stylized. But at the core the goal is the same: reducing opportunities for accidents by increasing visibility.

HOW DOES THE LAYOUT OF THE RESEARCH LABORATORIES COMPARE TO TODAY'S LABS?

The Research Labs are modular, repetitive spaces – as was the preferred practice at the time. A PI (Principal Investigator) with tenure and significant grant funding might be assigned multiple adjacent modules

with internal connecting doors, while a new hire may have received just one. This approach offered flexibility in space assignments over time; however, each PI's lab modules typically received some level of customization that may not have been useful over the extended life of the lab. This self-contained research suite approach relies less on shared support facilities across a floor, which reduces the opportunities for interaction between faculty and staff.

Research programs today tend to be large shared open labs with a focus on team-based problem solving, even between multiple faculty members. This arrangement also introduces students to the research workflows they'll encounter in the workforce. Still, when there are highly unique needs between PI's research activities, individual labs remain a logical approach.



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Teaching fume hoods, Burke Chemistry Building

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ON THE THEME OF COLLABORATION AND INTERACTION BETWEEN FACULTY AND STUDENTS, HOW DOES THE BUILDING SCORE?

Traditionally, there have been two distinct viewpoints on the ideal location for PI offices relative to the labs: adjacent for maximum supervision, or as remote as possible for privacy while trusting the grad students to manage the labs on a day to day basis. Burke includes both approaches, with clusters of offices completely outside of the “lab block” as well as a cluster at the end of the lab corridor. Both support structured interaction between faculty and staff; however, spontaneous “moments of learning” require another type of space.

This is where having the grad student collaboration spaces punctuating the length of the lab corridor – between both office clusters – pays dividends, beyond increased safety. These spaces support these valuable interactions – learning moments – with both visual and physical proximity to the labs. This, too, is a precursor to what we now think of as “huddle spaces” and interaction areas, which we regularly program into research environments and strategically locate at the intersection of research and workplace spaces.

WHAT HAVE BEEN THE CHALLENGES IN INTRODUCING NEW RESEARCH PROGRAMS?

All good research buildings are planned to accommodate modifications, both in the floor planning and in the infrastructure. In Burke, the overall floor layouts and lab-friendly structural bays enabled easy integration of new research programs. The main lab utilities distribution pathway was designed into the plenum above the lab corridor ceiling, leaving clear space

for additional utilities. However, after 30-plus years, much of that clear space had been claimed (as intended!), so we had to be a bit more creative to make the necessary connections. With the close collaboration of our MEP engineering partners, we were able to make the necessary extensions and connections to utility mains and head end equipment with a minimum disruption to adjoining areas.

SO WHAT'S THE CONCLUSION?

Burke is standing the test of time very well. All safety innovations are great investments, particularly when integrated into the architecture to make them easily accessible, as we did with Burke. Our modular planning has paid dividends with every renovation project across the life of the facility. Working collaboratively with the MEP team to design an expandable lab utilities distribution system does the same.

We're pleased and humbled to be working in Burke again, collaborating with Dartmouth to bolster their research programs.

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