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FEATURES

GREEN IS THE NEW BLACK IN GYMS

by Ivo Grossi

To reduce greenhouse gas emissions, college campuses need to start offering programs and initiatives to do their part in reducing these numbers. Many are starting this trend at the campus recreation centers.

INGENUITY ON DISPLAY AT HARVEY MUDD

by Sheila Wagner

Over the years, engineering students at Harvey Mudd College's Clinic Program have tackled design and manufacturing problems in over 1,600 projects for over 500 clients, including Fortune 500 companies.

BSC: PREPARING LIVES OF SIGNIFICANCE

by Hannah Wolfson

Thanks to The Bunting Center, hundreds of Birmingham Southern College students get hands-on experience with dozens of community partners from as close as College Hills and as far away as Africa.

FROM DNA TO DRAMA AT PRINCETON

by Gwen McNamara

STEAM Camp at Princeton University is a free student-led science and arts exploration summer camp open to underrepresented middle school students by the Pace Center for Civic Engagement.

BELHAVEN UNIVERSITY: MODERN SCIENCE & BIBLICAL TEACHINGS

by Rachel Clevenger

Professor of Chemistry and Division Chair of Natural Sciences at Belhaven University, Dr. Reid Bishop developed a learning environment offering enhanced facilities with modern scientific instrumentation and green, sustainable methods: a bridge connecting science with a biblical worldview.

BELHAVEN'S HISTORIC BUILDING TRANSFORMS INTO TOP SCIENCE FACILITY

by David Sprayberry

After a severe water leak, a 100-year-old historic building at Belhaven University was demolished, rebuilt, renovated, upgraded and given a new purpose—turning what could have been a great loss into a renewal of the sciences.

BROWN'S ENGAGED SCHOLARS: ACTION THROUGH ACADEMICS

by Jessica Brown

Through Brown's Engaged Scholars program, students use lessons from the classroom to protect the environment, teach teens about sexual health, and make connections between ancient and contemporary civilizations.

DUKE'S GREEN LAB PROGRAM: CREATING SUSTAINABLE RESEARCH LABS

by Randy Smith

On a square footage basis, research labs can require five times more energy to operate than traditional classrooms. Several factors, when combined, can result in a significant environmental impact, which is why it has never been more important to develop sustainable research labs.

Cover photo courtesy Belhaven University

EDITOR'S LETTER

Whenever math or science professors are nominated by their colleges or universities, I'm always a bit more anxious about the interview than I would be if their subject matter seems to fall in my wheelhouse. If I know I'll be chatting with someone in the arts or social sciences, I feel confident I'll never be lost in the conversations.

I'm not sure why this apprehension has persisted over six years of conducting these interviews; not once has a math person thrown an equation at me before they would answer my questions: a CAPTCHA to prove I am worthy of moving on to the next step—or a reverse CAPTCHA, really, because a computer could certainly handle the math/science conversation more easily than a CompRhet person.

Not one science professor has declared, "Well, clearly your understanding of the hard sciences is lacking, so good day, madam."

Moreover, I have always spoken to math and science experts who were abundantly skilled in making their material accessible to their audience, which is in part a result of their being talented educators. The other part could be that they are not another breed of human. I've realized there's much to connect mathematicians and scientists and artsy folks.

Dr. Reid Bishop is a perfect example of that moment when I realize I not only have the ability to connect with a science/math person, but I can also learn a great deal from them if I work past the unfounded worries that I'm not "one of them." Though science is his field, Reid was originally an artist, and he still has the soul of an artist—if I can be forgiven the fluffy, cheesy observation. He brings his artistic talents and creativity into all that he does, as many professors do.

Robert Root-Bernstein contributed a blog piece recently for www.sciencemag.org, "Incorporating humanities, arts, crafts, and design into curricula makes better scientists." He notes that the inventor of the stethoscope, René Laennec, made his first observation about heart sounds using musical notation. Nobel laureate Alexis Carrel developed suturing techniques now used in organ transplants that he first developed in lacemaking. The tools required for the first open-heart surgery were developed by African-American Vivien Thomas, who had been initially trained as a master carpenter. Actress Hedy Lamaar collaborated with composer George Antheil to develop the modern encryption methods used for electronic messaging; even the chips that work our computers and phones began as artistic innovations in silk-screen printing, etching, and photolithography.

Those interesting historical tidbits aside, Root-Bernstein reminds us of an argument recently forwarded by the Board of Higher Education and Workforce of the U.S. National Academies of Sciences, Engineering, and Medicine—where they stressed how crucial it is for HACD practices (humanities, arts, crafts, and design) to be integrated with STEMM classes (science, technology, engineering, and mathematics) in university and post-graduate course design.

He explains that this move is intended to address a growing divide in our country's educational systems between "traditional liberal arts curricula and job-related specialization." The report notes the movement toward more narrow education in high-tech areas has led—ironically—to less proficiency in critical thinking, lifelong learning, teamwork, and communication.

The conclusion of the report asserts, "A preponderance of evidence converges on the conclusion that incorporating HACD into STEMM pedagogies can improve STEMM performance." The message is clear. There never should have been the presumed disconnect between the arts and sciences, but now that we know it exists, we must all work together to undo that damage.

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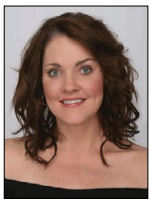

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Several years ago, Dr. Reid Bishop made the bold move to leave a tenured position to join the faculty of Belhaven University because he saw a once-in-a-lifetime opportunity to build something from scratch in an academic environment that encouraged innovation. Now a professor of Chemistry and Division Chair of Natural Sciences at Belhaven University, Bishop oversees a learning environment that is distinct from other programs and offers enhanced facilities with modern scientific instrumentation while embracing green practices and sustainability. It's a program that connects science with Belhaven's biblical worldview.

PROFESSOR SPOTLIGHT

by Rachel Clevenger

Belhaven University: Modern Science & Biblical Teachings

The Art of Science

Dr. Reid Bishop did not initially plan to be a scientist. His first academic passions were in the Fine Arts, and he wanted to be a sculptor or painter. As he continued on that path, he realized he needed a smart way to monetize those gifts, so he looked into scientific illustrations, and he soon found himself moving in another direction.

After transitioning from the Fine Arts to a focus on science, he assumed he would stay in "hardcore research science"; as he recalls those choices now, he believes he had "a very narrow kind of view." Even within the context of being a Christian in science, as he plodded away making all the appropriate moves in a traditional career trajectory, he realized that God was not calling him in that direction.

Then, both of his parents fell ill. After his father succumbed to a difficult bout with cancer, Bishop realized that he needed to find a life that was about more than being "chained to a lab bench." Connecting with the National Audubon Society, he started appreciating "idealistic, aesthetic things" in a way that he had not before, and eventually he realized there had been a fundamental shift in his perspective, which forever altered the way he viewed our approach to problems that need solutions.

A Mission of Innovation

Soon after this realization, Bishop left a tenured position and landed at Belhaven at what felt like just the right moment. The science program was uneven in spots, weighted toward Biology, and President Roger Parrott wanted something innovative, exciting, and different. The older buildings and traditional teaching philosophies were all replaced with something at once more modern and more meaningful. They realized, Bishop explains, that they did not have to do things the same way everyone else was doing them.

Parrott, having built a Fine Arts program to rival any other in the nation, was ready to turn his attention to other endeavors. He wanted to find a way to be on the leading edge of quality, and he knew Bishop could build that program, given the funding. Bishop adds that in any smaller, mission-oriented school there may not be "loads of cash to spend," yet he was asked, "If you could build what you wanted, what would you build?"

When Parrott met with the architect after Bishop had offered his input and wish-list, the architect said he'd never had a faculty member ask for ways they could spend less money on a new building. "When you have faculty members like that, it's easy to want to find them the money," Parrott explains. "He doesn't ask for the moon," Parrott adds, and that gives them the opportunity to "put the dollars in places that really count."

A new science building was developed—the specifics of which are covered in more detail by Belhaven's David Sprayberry on page 16—and with the new structure and program came new opportunities for hiring. Bishop also notes they were expanding the program at a time when equipment that was once prohibitively expensive was getting cheaper and smaller. Bishop sees his role as an encourager of the good work being done by the "young, energetic, and enthusiastic" math and science faculty who are all like-minded people who have "great hearts."

God Made Us All Scientists

Bishop explains that Belhaven students are taught not only "the stuff of science," but also the applications for that science—moments where they can put their work in perspective and recognize how science can serve others. In fact, Bishop believes this concept may explain why so many students across the country claim they don't enjoy science; perhaps it's not being taught correctly.

Additionally, he wanted to ask big questions as they planned the work for Belhaven students in general and the role of his department specifically: What is the value of science? What are the limitations of science? How can science help with public health or with conservation?

Students aren't inspired, he continues, by courses that serve up science as something dry and methodical. He wants students to find a

problem first—something they feel connected to—and then determine what science they need to learn and practice in order to seek answers for that problem.

If a problem is inquiry-based, he adds, you don't have to learn the entire periodic table before you start addressing that problem. He's quick to add, however, that these courses aren't "Chemistry for Cowboys" or "Rocks for Jocks"—as some courses have been dubbed on other campuses. Even in a class filled with students of wildly varying abilities and majors from across the board, there is absolutely no "dumbing down" of the content, and the fundamentals are still there.

The difference is that experiments at Belhaven are designed to have a purpose. Rather than using lab resources to conduct General Lab Experiment A, General Lab Experiment B, and so on—students are challenged to develop experiments that serve a purpose and to use those resources for something that matters. In short, he adds, they can spend time "rehashing the same old junk," or they can focus on being innovative and creative.

He also sees no disconnect between a Christian-based university—with a motto extolling the virtues of serving rather than being served—doing important scientific work. Since we go about our days constantly learning through the process of trial-and-error, Bishop concludes, "God made us all scientists."

Bishop wanted to ask big questions as Belhaven faculty planned the work for Belhaven students in general and the role of his department specifically: What is the value of science? What are the limitations of science? How can science help with public health or with conservation?

Local Projects

In a recent project with the Jackson Zoo, dance majors from the classes have interpreted the movement of animals, some students have analyzed the quality of water coming in and out of the local zoo, and others have examined animal enclosures to determine how closely those spaces mimic their natural habitats.

Belhaven has also developed a partnership with Wildlife Mississippi, focusing on 3000 acres of wildlife wetlands deeded from the Department of Transportation; students have been working on categorizing the value of The Fannye Cook Natural Area to the surrounding urban environment, learning from one of the largest urban wetlands. Additionally, they are partnered with TARA Wildlife in Vicksburg, Mississippi, focused on studying the Mississippi River, which connects 45% of the nation's watershed and serves as a huge migratory byway.

Additionally, they are partnering with Friends of the Mississippi River Basin Model to develop a virtual model of the Mississippi River Basin Model, a structure located only a few miles from the Belhaven campus; built by German prisoners of war in order for American soldiers to consider how to best defend against an invading power, the Mississippi River Basin Model is the largest small-scale model ever built, stretching eight miles long and covering 200 acres.

New Ways to Think About Science

Last year at Belhaven, in his presentation for the STEM Education Symposium that they organized on campus, Bishop outlined for his audience the way Belhaven had established partnerships in their community that actively engaged their Science and Mathematics instructors and students in "meaningful and relevant educational experiences." All of their students, Bishop adds,

are using science in ways that assist real-world efforts; because of this, students are getting jobs, earning internships, and finding news ways of thinking about science.

This work, Bishop goes on to say, helps connect students to different paths via their coursework and all work toward instilling "an Entrepreneurial Spirit," so students are trained in bringing value to their communities, big and small. Bishop explains that both instructors and students benefit when courses and programs are integrated with real-world problems, especially when those issues result in opportunities to build local connections.

He believes math and science textbooks are often detached, highly generalized perspectives that seem to hold no real-world, immediate value for the average student. In order to overcome that disconnect, he encourages instructors to augment STEM courses with resources gained via partnerships with local and regional entities—zoos, museums, business, parks, and government or non-government organizations. He believes this allows teachers to "breathe much needed life into their potentially stale course material."


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As a natural offshoot of his love of science and concern for the environment, Bishop has led the charge in decreasing the environmental footprint of the Belhaven University campus labs by using the principles of green chemistry.

Breathing Life into Stale Material

Former student Jeremiah Reese, now working toward his next degree in medical school, states that Bishop is "no ordinary professor" who gets stuck using the same material and methods year after year. "Dr. Bishop prefers innovation to stagnancy," Reese adds "and works hard at developing new curriculum."

For example, in organic chemistry, Bishop loaned ball-and-stick models to his students so they could build molecules to help them learn complicated concepts. Reese recalls one day that Bishop was teaching molecular vibrations, and he walked to the corner of the classroom, tapping his shoulders on the walls—back and forth—to show how molecular vibrations decease in certain circumstances. "Dr. Bishop loves learning, and it showed in his chemistry skills and teaching," Reese adds. His favorite expression that Bishop often used was, "I could do that in 15 minutes"—a phrase he would throw out during experiments, a claim that was in essence "a healthy challenge to students to work efficiently."

Reese praises Bishop most for creating something entirely new for Belhaven students. "His premise was that at Belhaven we have art, history, English, Literature requirements, but not a science class for non-science majors," Reese explains, so Bishop wanted to create a class structured around upperclassmen in the sciences, where each group evaluated each of their group's members; participants were held accountable for their assignments. The groups wrote and conducted an experiment, and their findings were presented at the end of the semester, where Bishop kept it interesting and competitive by offering a reward for the best plan and results. "From the perspective of a chemistry student, I benefited from learning how to communicate with students with passions outside of the sciences," Reese explains. "I also began learning how to assemble teams for large experiments."

Belhaven student Yaharim Satterwhite is currently benefitting from Bishop's pedagogical talents this semester. She notes that a smaller university, where the class size may only have four or five students, has offered an education unlike anything she's experienced before Belhaven. Meeting Bishop, she notes, has similarly been life-changing. "Dr. Bishop is a very busy man," she adds, "yet he still devotes so much time to his students, so they can excel in any of his classes."

Green Chemistry: Biblical Stewardship in Action

As a natural offshoot of his love of science and concern for the environment, Bishop has led the charge in decreasing the environmental footprint of the campus labs by using the principles of green

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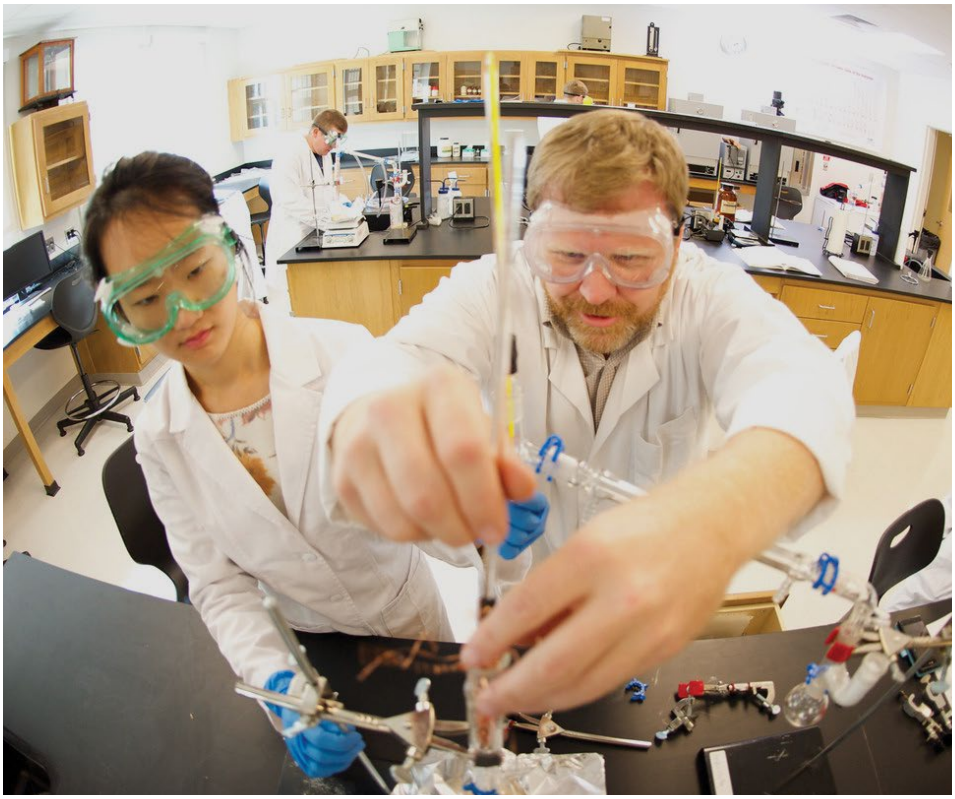

chemistry. While some improvements take time and money, many of the goals for sustainability can be achieved by simple changes in human behavior. He notes, "If you can work smarter, why don't you?" Certainly, chemistry programs are known for the amount of hazardous waste produced; as a conservationist, he adds, he "couldn't live with that." Thus, he built the entire department on green principles, which he sees as "biblical stewardship in action."

Rose Mary Foncree, part of the English faculty at Belhaven, has worked on a class with Bishop, as they are both passionate conservationists who want to encourage students to learn more about their responsibility to the environment. The Literature of Ecology course began, she explains, because Belhaven wanted to offer more electives for their students, and in her work with Bishop, she's watched students who were initially resistant to any discussion of environmental issues become supporters of environmental protections and cognizant of dangers to the environment.

While Bishop teases that he's a "professional biochemist but only a novice ecologist," Foncree believes Bishop's experiences with the

Audubon Society offer students something special and distinct, since she considers herself more theoretical in her approaches. Because he has taken students into the filed, she explains, Bishop "brings authenticity."

Additionally, an important goal of the class, Foncree explains, is for students to analyze the literature of ecology from a biblical perspective. Science can be a "boogeyman to Christians," Bishop admits, or secular people can be leery of the work of Christian scientists, but he sees the connection clearly between the spiritual/natural and scientific/academic worlds.

Even in a dominion model, he explains, "Christians aren't absolved of protecting the planet." President Parrott agrees, noting that it's a Christian responsibility to care for and protect the earth, while it's important to do so in a "meaningful and balanced way." Belhaven is seeking that exact balance.

Science Education for New Civic Engagements and Responsibilities

Dr. Cathy Middlecamp, a professor in the Nelson Institute for Environmental Studies at the University of Wisconsin-Madison, is one of Bishop's colleagues in SENCER (Science Education for New Civic Engagements and Responsibilities). She notes that the Mississippi Delta has been a "wonderful playground" for Bishop's work.

Aside from his own talents, Bishop has been blessed with "good players and good backing," Middlecamp observes, which leaves him poised to do great work at a university that has already devoted itself to service and engagement, so faculty aren't pressed to seek out students willing to share their time and energy to better their communities. "It's there," she adds, "You don't have to go looking for it."

Dr. Richard Sheardy of Texas Woman's University notes that he "has known Reid scientifically for a long time," as they have overlapping scholarly interests, and they are both deeply committed to SENCER; Sheardy is SCI-Southwest Co-Director. He states that while the project began about seven years ago, it became a center for innovation soon after, and part of his job became recruiting other schools into the process. Naturally, he thought of Bishop; now Bishop serves on the Leadership Council. Sheardy sums up SENCER at a "network of people with really cool ideas about how to help students learn."

He is collaborating with Bishop currently on a course about the Mississippi River—the culture, the environment, the ecology, and the inter-related nature of all of those things. His appreciation for his colleague's talents don't stop at the academic, though; he praises Bishop's work as a teacher, as a worship leader (who Sheardy saw preach, bringing a roomful of people to tears with a stirring message), as a musician, and as an artist. He concludes that his colleague Reid Bishop is "really quite a remarkable guy."

ABOUT THE AUTHOR: Dr. Rachel James Clevenger earned her M.Ed. degree from Mississippi College. After finishing her PhD in Composition and Rhetoric, she taught and served as the University Writing Center Director for Birmingham Southern College and University of Alabama at Birmingham. Most recently, she taught Business Communications at Samford University.

LABS AND RESEARCH FACILITIES

by David Sprayberry

Belhaven University's Historic Building Transforms Into Top Science Facility

When it comes to teaching science in higher education, professors need the right facilities to reinforce and supplement what they are teaching. When professors have those advanced facilities, it can make all the difference in a student's learning experience.

Belhaven University in Jackson, Mississippi, turned what could have been a great loss into a renewal of the sciences. A few years ago, Fitzhugh Hall—a historic 100-year-old building—suffered a severe water leak that led to structural damage and had to come down.

In only a year and a half, the historic building was demolished, rebuilt, renovated, upgraded and given a new purpose as the home of Belhaven University's School of Science and Mathematics.

Five programs of distinction, that include biology, chemistry, sports medicine, exercise science and mathematics, have put Belhaven on the map of universities that are excelling in the sciences. Fitzhugh Hall is now complete and bursting with life as students fill its classrooms once again.

Fitzhugh Hall: A Game Changer

Dr. Roger Parrott, President of Belhaven University, notes that Fitzhugh Hall was a game-changer for them, allowing for a new level of quality education for their students. Though Belhaven had already achieved a high ranking, the remodeled Fitzhugh Hall left

the sky as the limit for them, President Parrott explains, offering a significant opportunity for the future of Belhaven.

He adds, "I never imagined we could create a state-of-the-art science building that looks 100 years old and do it with such careful stewardship that those who know science are shocked at how much we were able to get for the facility."

Faculty Offered Crucial Role in Planning and Development

The science faculty members took a major role in the planning and development of Fitzhugh Hall. They partnered with architects to figure out how to best utilize the space and make it a top science facility.

One of the items on the top of their priority list was the procurement of modern lab and classroom equipment in order to give each student the best resources to learn. Their goal is to help students graduate with applicable skills as well as conceptual understanding through the hands-on use of research-grade technology and instrumentation.

Dr. Paul Reese, Associate Professor of Biology, said, "Our biology students have really enjoyed the use of our Leica microscopes. Some of our microscopes have a camera mounted on them so we can hook the camera up to our 70-inch television and have the whole class see the incredible details inside of cells." Students also have access to software that allows them to save the image on a lab computer or their own personal laptop for review later.

Dr. Robert Waltzer, Associate Professor of Biology, appreciates the versatility of each lab and classroom space that is moveable and customizable, but he has been even more delighted by the instrumentation the biology department has access to, following the rebuilding and renovation.

Waltzer notes that they gained new measuring instrumentation for physiology and neuroscience that could be interfaced with computers, adding, "We are able to stimulate and record from nerves and conduct studies of muscles and the heart as well as EEGs and sleep measurements."

Belhaven's Genetics, Botany and Ecology Laboratory has two Climatariums where students can grow plants under controlled conditions, and can manage the type of light, hours of light per day, and temperature. Students have already been conducting plant propagation research and experiments with this new technology.

An Inspired Facility Can Inspire Students

Dr. Reid Bishop, Professor of Chemistry, has utilized the new facility to inspire his chemistry students. "The laboratory is spacious, clean and completely modern with an abundance of high quality computational equipment and analytical instrumentation. Combined, these facilities are used to enhance the experiences of students looking to pursue medical, dental, pharmacy or graduate school or for those interested in going straight into the work force in teaching or chemical and pharmaceutical industries," said Dr. Bishop.

He was also excited to see the investment that Belhaven has made in the area of fluorescence spectroscopy, a type of study that measures molecules by using light. Dr. Bishop believes that this area of study connects most areas of modern science and will enhance Belhaven's new majors in biochemistry and chemical physics.

Behind-the-Scenes Upgrades

Many of the upgrades and modernizations in Fitzhugh are working "behind the scenes" and are not visible. The building has three levels of filtered


Photo by David Sprayberry

water for conducting sensitive experiments, and the laboratories provide students with access to a house vacuum system, gas and compressed air. The facility also has the highest quality ventilation systems for purifying the air in the building.

The School of Science and Mathematics is one of a few programs in the area capable of accommodating students with a variety of physical disabilities. Dr. Bishop points out that all of the labs were designed to meet the most stringent Americans with Disabilities Act (ADA) requirements, including making Belhaven's labs fully accessible to wheelchairs.

The building supports Belhaven's environmentally conscious (green) science programs and was built to meet requirements in energy saving. Lights are set on a timer and turn off when no one is active in the building. Students can refill their water bottles at dispensers that give drinkers a tally of the plastic waste eliminated from the environment.

Student chemists at Belhaven are experiencing what only a handful of universities across the country ever encounter: a completely green chemistry program. In fact, Belhaven has the only chemistry department in Mississippi that has adopted a green perspective in every class and laboratory.

A Perfectly Timed Transformation

Fitzhugh Hall's transformation came at the perfect time for Belhaven University's new School of Nursing. The nursing program received approval that same year from the Mississippi Institutions of Higher Learning (IHL) for its Bachelor of Science in Nursing (BSN).

Nursing students gained access to quality health care training at a university level. Belhaven's School of Nursing provides a win-win situation for nursing and the state of Mississippi. As changes in healthcare reform impact the demand for quality healthcare services, Belhaven's nursing program is in a position to respond to the complexities and nuances of a diverse healthcare environment.

Fitzhugh Hall is a testament to Belhaven University's continued vision for its students pursuing degrees in biology, chemistry, nursing or mathematics, giving students the best facility, tools and experience to go out into their careers and succeed.

ABOUT THE AUTHOR: David Sprayberry is the Assistant Director of University Relations at Belhaven University in Jackson, Mississippi. He earned his B.S. in Public Relations at Mississippi College and has worked at Belhaven University since 2011. He has over 16 years of experience in public relations.

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ON CAMPUS

by Jessica Brown

Brown's Engaged Scholars Program: Engaged Scholars Take Action through Academics

Through Brown's Engaged Scholars program, students use lessons from the classroom to protect the environment, teach teens about sexual health, and make connections between ancient and contemporary civilizations.

Even before he decided to study archaeology Aliosha Bielenberg '20 knew he wanted to be an academic. But he disliked the idea of spending his entire career in the often insular world of academia.

"Like a lot of Brown students, I care a lot about community engagement," Bielenberg says. "And I also care about breaking down the ivory tower."

That's why he and many other students have been eager to join the University's Engaged Scholars Program (ESP), which combines traditional classroom work with real-world experience addressing social challenges. Launched in 2015 with just 42 students from five concentrations, it's since grown to 180 students from 16 concentrations.

"While other universities have an engaged scholar program, it's often offered as a minor in civic engagement or communication studies," explains Allen Hance, the Director of Engaged Scholarship at the Swearer Center for Public Service at Brown. "Brown's program stands out because it's linked to a student's concentration, so they're learning about engaged scholarship in the context of their discipline."

Aliosha Bielenberg ’20

Digging deeper into ancient and modern cultures

When Bielenberg learned last summer that archaeology would be added to ESP, he was thrilled. “While there’s often an element of community engagement in archaeological projects,” he says, “this program is great for me because my focus is on investigating ways local communities interact with excavation sites and with the past.”

He took the courses Occupy Archaeology! Interrogating Inequality, Past and Present and Decolonizing Classical Antiquity: White Nationalism, Colonialism, and Ancient Material Heritage, both of which satisfied ESP program requirements. (See sidebar, “How ESP Works.”)

This summer, he’ll complete his ESP practicum by working on the Koutroulou Magoula Archaeology and Archaeological Ethnography Project in Greece, one of Brown’s current archaeological field projects. “I speak Greek, so one of my responsibilities will be interviewing members of the local communities

HOW IT WORKS

Once accepted into the Engaged Scholars Program, students must complete four requirements:

1. Engaged courses
Students choose from classes, typically two to three, that cover specific social challenges and theories and research methods; some involve working with partner organizations in the community.

2. ESP practicum
Students apply what they've learned in class through participation in a 150- to 250-hour "engagement experience"—typically an internship, volunteer experience, fellowship, or community project. The practicum can be locally, nationally, or internationally based, conducted individually or in groups.

3. ESP seminar: The Theory and Practice of Engaged Scholarship
Taught at the Swearer Center, this class brings together ESP students from a variety of concentrations to examine the theory, practice, and ethics of engaged scholarship via lectures, workshops and more.

4. ESP Capstone
The "culminating experience" of the program, this is an engaged project with a meaningful social benefit. Students share their project with a public audience through an oral presentation or a written or digital product.

about place names and where they came from," Bielenberg says. He and the team have also been discussing ways to attract tourists to the site, which residents say would help boost the local economy.

His interest in engaged scholarship even extends beyond his concentration. To improve his French, he took The Experience of Refugees and Immigrants, a class that combines lectures with volunteer work at Women's Refugee Care (WRC), a local nonprofit that helps families from the French-speaking African countries settle in the United States. Though the class ended last winter, Bielenberg was so inspired by the experience that he still contributes his time there.

Ethan Morelion '20
Improving sex ed on a local level

ESP political science concentrator Ethan Morelion '20 developed a passion for community service and social justice during high school on the debate team."That experience really woke me up," Morelion says. "I grew up in a rural, low-income part of Texas where people didn't talk about progress or change."

Like Bielenberg, Morelion ended up fulfilling part of ESP's requirements before he was even part of the program. When the Swearer Center named him one of their Bonner Community Fellows his freshman year, he began working with the Center's Sexual Health Advocacy through Peer Education (SHAPE) group, which partners with Planned Parenthood to teach sexual health to high school students in low-income areas of Providence. His time there will count as his ESP practicum.

"Working with those students was truly reciprocal because they were teaching me as well by asking questions," Morelion says. "Many thought birth control pills were the only form of contraception available beyond condoms, which some students thought there was an age limit on purchasing. Others didn't know what an IUD was or where they could get one."

That's all knowledge he plans to use to develop a national recommendation for a sexual education program, which he hopes will be his ESP capstone project.

Lauren Maunus '19

Protecting the environment

"I've always preferred to learn through doing, so that's why I gravitated to engaged scholarship so early into my time at Brown," says Lauren Maunus '19, who knew right away that ESP was perfect for her. By the end of her freshman year she'd been accepted to ESP and declared her concentration in environmental studies.

One of the first courses she took freshman year was Humans, Nature, and the Environment, an engaged class in which students work with a community partner on an environmental issue. She participated in two projects: one with Providence's recycling commission to help research how to improve the city's recycling rate, the other a campaign called Save the Produce that she would continue during another engaged class she took the following semester, Urban Agriculture: The Importance of Localized Food Systems. She and her fellow students created signs to put up at farmers' markets explaining how to use less commonly consumed parts of vegetables to reduce food waste.

The program has also taken her abroad. In 2017, she traveled to The Hague in the Netherlands to attend and write about the Monsanto Tribunal, an effort led by grassroots groups to hold the food giant accountable for human rights and environmental abuses.

"That was an unbelievable opportunity," Maunus says. "My advisors in the environmental studies department and at Swearer were really encouraging when I pitched the idea to make it an independent study, and Swearer gave me the funding I needed to attend."

ABOUT THE AUTHOR: Jessica Brown is a freelance writer and editor in Brooklyn, NY. Brown is a NYU journalism grad and has a medical writing and editing certification from the University of Chicago. Her clients include Prevention and Johnson & Johnson.

SUSTAINABILITY AND GREEN INITIATIVES

by Randy Smith

Duke University's Green Lab Program: Creating More Sustainable Research Labs

On a per square foot basis, research labs can require five times more energy to operate than classrooms and office spaces. That's a lot of chilled water, steam and electricity, not to mention dollars. If your local utility company uses fossil fuel as the primary fuel source for electrical generation, the carbon footprint for a typical research laboratory can be quite large.

Average Research Lab Results In Significant Environmental Impact

Laboratories also typically utilize hazardous chemicals and a large volume of consumable supplies and copious amounts of water. All these factors taken together can result in a significant environmental impact for the average research lab.

Creating a Sustainable Lab: New Construction

If you're lucky enough to be planning for a new laboratory building, you begin with the understanding that you will have to pay to operate and maintain the building for maybe upwards of forty years.

Due consideration of "lifetime cost"—the purchase price, plus operation and maintenance costs over the life of an item—here is critical. "Value

engineering" on building systems that lower the purchase price but increase operating and maintenance costs may not look like a good value ten years down the road.

There are many options out there for high efficiency fume hoods, "intelligent" ventilation systems and the like that can be incorporated into either new construction or to a retrofit that can have a significant impact on bottom line operating costs. This would also be a great time to consider space for a "freezer farm" for shared ultralow temperature storage of biological samples, potentially reducing plug load and heat load.

Creating a More Sustainable Lab: Renovating and Remodeling

If you're like most of us, you're not currently designing a new lab but trying to reduce the environmental (and cost) impacts of the labs you're working in now. In order to encourage and guide laboratories in their sustainability efforts, many universities have created a "Green Lab" program.

These programs, customized to each university's needs, set the bar by defining expectations and sustainable lab criteria, then provide resources to help labs achieve their sustainability goals.

Additionally, the programs often follow up with some recognition of the achievements made. Although the Green Lab programs will vary among institutions, most address similar issues revolving around energy conservation, water conservation, hazardous chemical usage, green purchasing and recycling. While some of these issues involve changes to equipment or facilities, most are addressed by behavioral changes of the people in the labs.

Fume Hoods and Energy Usage

Energy usage in a laboratory is driven by ventilation (including heating, cooling and humidity control), lighting and plug load (equipment plugged into electrical receptacles).

The fume hood is the major culprit here. Installation of high efficiency, low flow hoods and intelligent ventilation systems are great additions at the facility level, but proper fume hood sash operation by lab personnel is also key.

Closing the sash of a hood equipped with a variable speed fan can greatly reduce the volume of conditioned air expelled from the lab, potentially saving thousands of dollars each year. Many schools have run "Shut the Sash" awareness campaigns and contests to affect this behavioral change.

Energy use from lighting can be reduced by selective elimination of lighting where appropriate, the substitution of task lighting, or just turning out the lights at the end of the day.

Using More Energy-Efficient Equipment

Selection of energy efficient equipment (Energy Star rated, when available), particularly freezers and refrigerators, is important for energy conservation.

For example, full size refrigerators and freezers are generally more energy efficient, on a cooling volume basis, than undercounter models. Simply turning off unused lab equipment and computers will also contribute to energy use reductions.

For most labs, the second largest energy hog (after the fume hood) is an ultralow temperature freezer. They not only draw a lot of electricity but they also give off significant heat into the room that must be cooled.

Freezer preventive maintenance programs will extend the life and efficiency of the equipment, and freezer inventory programs that encourage the discarding of obsolete samples can help reduce the number of freezers in operation.

Elements of Lab Water Conservation

An important element of water conservation for sustainable labs is the elimination of single pass cooling of equipment or reactions with tap water. Sometimes this need can be eliminated with something as simple as an apparatus made from an ice bath and an aquarium pump.

More sophisticated (and expensive) solutions involve small recirculating water chillers or built-in chilled water loops. Conservation of purified (DI, RO, etc) water is important, too, since it takes 2 to 3 volumes of water to make 1 volume of purified water. Sterilizers can also be modified to utilize less water.

Funding Sources and Financial Incentives

When considering energy and water conservation measures, it is important to keep in mind where the financial incentives lie. Generally speaking, the faculty are not responsible for paying energy or water costs associated with their research lab and therefore may need encouragement through funding assistance in order to make changes to equipment.

It seems logical that the funding source would be the entity that benefits from reduced energy and water usage. At my institution, this is at the school level. Arts and Sciences has two programs in place to assist faculty with energy efficient equipment upgrades.

One program bridges the cost differential between standard equipment models and more energy efficient models. The second is a purchasing assistance program that focuses on ultralow temperature storage by providing $3000 toward the purchase price of a specific ultracold freezer model that saves $500 per year in energy costs vs. other models.

Benefits of Practicing Green Chemistry

Making a lab more sustainable also involves reducing the quantity of hazardous materials that leave the lab. Practicing "green chemistry" can help. MIT and the EPA have resources on the web that can be a guide.

Additionally, taking care to keep the quantities of hazardous material ordered to that actually needed is important; that quantity discount may not really be a great deal from an environmental point of view come disposal time. And, following all federal, state and local regulations goes without saying.

Recycling and Green Purchasing

Green purchasing and recycling go hand in hand. Green purchasing covers everything from choosing supplies with recycled or recyclable content, to buying from suppliers with sustainability certifications, to simply grouping orders to reduce shipping packaging.

Many vendors will take back their shipping containers or things like pipet tip boxes; with a little effort, most things are recyclable.

A Huge Piece of the Campus Environmental Footprint

Research labs can be a huge part of the environmental footprint of a college campus. Many of the steps needed to be taken to make those labs more environmentally sustainable and less costly to operate are free or low cost, involving only changes in occupant behavior.

Other changes may have significant initial costs but attractive returns on investment. There is no need to reinvent the wheel here. Many of your colleagues have gotten started and are happy to share their experiences.

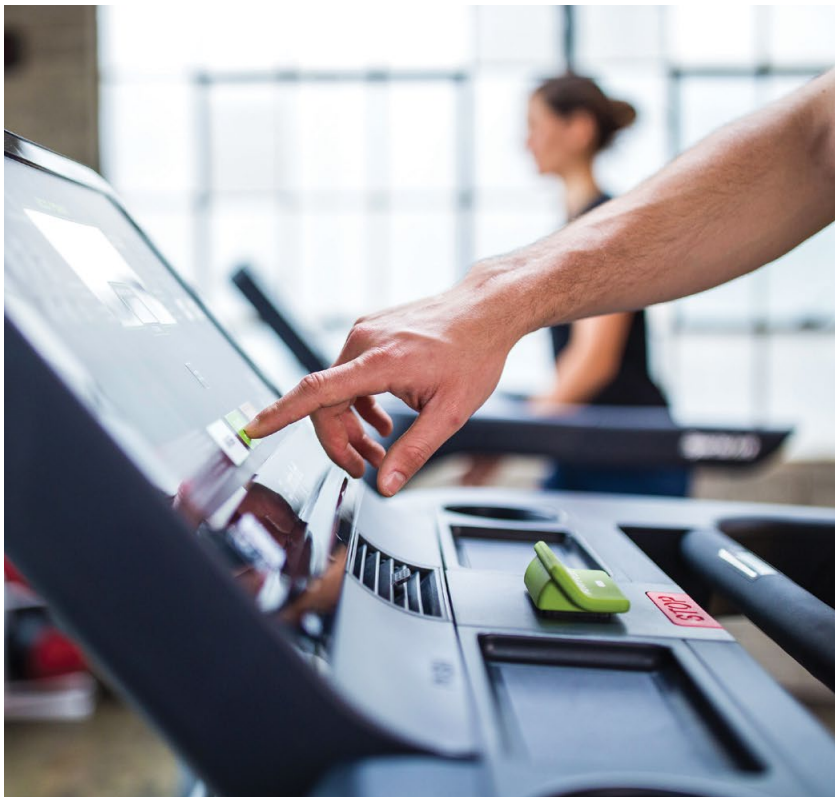
ABOUT THE AUTHOR: Randy Smith, LEED-GA, is Manager of Department of Biology at Duke University and Convener of Green Labs at Duke. His current major project is to reduce energy and resources used by the science buildings of Arts and Sciences.

GREEN IS THE NEW BLACK:

How Campus Recreation Centers Encourage Eco-Friendlier Living

by Ivo Grossi

In the era of sustainability and green movements, colleges are starting to "go green" as a way to not only help our planet, but to encourage students and staff to live an eco-friendlier life. The U.S. Green Building Council (USGBC) estimates that buildings in the U.S. consume 14 percent of the potable water (water safe for consumption) and 41 percent of the energy consumption.



To reduce greenhouse gas emissions, companies with large spaces, such as college campuses, need to start offering programs and initiatives to do their part in reducing these numbers. Many universities are starting this trend at the source—the campus recreation centers.

Traditionally, gyms are a huge source of energy between the fluorescent lights, air conditioning and various TV's. There are two phases of implementing more eco-friendly practices into this environment: long term and short-term quick fixes.

Long Term

If the budget is available, the biggest investments Universities can make is to reduce the amount of energy being used. To do this, larger installations in places such as recreation and wellness centers are key, such as investing in environmentally responsible fitness equipment.

There are new, innovative lines of this equipment that can convert human generated energy into utility-grade electricity that powers the facility. By installing energy producing equipment, facilities and their members can have an impact on the environment every time they hit start on the machines.

Depending on the amount of equipment and hours used, for example, a gym with 20 energy producing treadmills, 20 ellipticals, ten upright and ten recumbent cycles, used 12

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Making gradual changes is an affordable way of reaching your end goal of going green. Not only do these green and sustainability efforts help the planet, but they can also set you apart from competitors and attract more students that share the same green values.

hours a day, seven days a week, on average can reduce 0.81 metric tons of CO2 each year. We are starting to see gyms all around the world, such as Sacramento Eco Fitness in California and Terra Hale in England, install this type of equipment.

Benefiting the Planet While Reducing Energy Bills

As a result of these additions, gyms can produce a significant amount of energy which not only benefits the planet, but ultimately reduces the cost of the monthly energy bill as well. Another large installation that can have a dramatic impact are solar panels.

Using solar panels is another great way of collecting natural energy, this time through sunlight, that generates electricity. Solar panels can be installed over the entire roof, or just portions that see heavy amounts of sunlight. Lastly, a big change that can be made is installing low-flow faucets, showers and toilets. Between all of the toilets, showers, sinks and water filling stations on campus, installing low-flow products helps to cut down the amount of water that is being used.

Quick Fixes

If you are looking to make improvements right away, there are many changes you can start implementing to speed up your transition to becoming a green facility. These changes are an affordable way to get into the green game. Here are a handful of product changes and initiatives to get you started:

First, you can add biodegradable products to your gym. Contrary to what one might think, biodegradable soap, toilet paper and paper towels exist.

Secondly, make the move to all natural cleaning supplies. By avoiding harsh chemicals inside aerosol cans that can harm the air, switch to eco-friendly cleaning supplies made of all-natural ingredients that don't negatively impact the environment.

Next, you can promote a plastic-free life by selling glass water bottles at the gym to avoid members constantly bringing in disposable, plastic water bottles.

Additionally, you can initiate a recycling program. Get a recycling bin and offer incentive points for members. This can be as simple as offering a free fitness class for each amount of recycled material brought in.

You can also acquire energy-efficient light bulbs. Most energy-efficient bulbs use roughly 20 to 25 percent of the energy that traditional bulbs do, and can last up to 25 times longer. Other options include installing dimmers so you aren't using as much energy.

Finally, be sure to pre-set your thermostat. Set your thermostats so that the air or heat does not kick on during closed hours. This is another move that helps to reduce energy while simultaneously saving you money. Using a smart thermostat can help you regulate this best.

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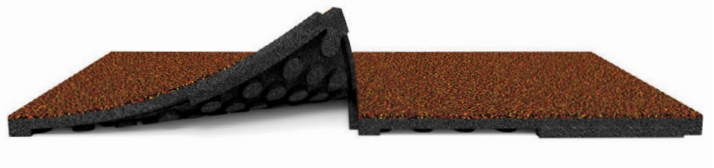

End Goal

While you might not be able to notice any instant changes, especially with the quick fixes, these gestures go a long way once practiced over time. Going green is a process that the college, recreation center, and students can all take pride in. It is easiest to start the transition with some of the quick fixes, and slowly making your way to larger installations.

Making gradual changes is an affordable way of reaching your end goal of going green. Not only do these green and sustainability efforts help the planet, but they can also set you apart from competitors and attract more students that share the same green values. High school aged students are in a generation that was raised to make a cautious effort to lead an eco-friendly lifestyle. In the end, seeing a college that takes sustainability seriously is very appealing to them.

ABOUT THE AUTHOR: Ivo Grossi brings over 20 years of international executive experience in the fitness, health and wellness industry to his role as CEO of the Americas with SportsArt, producers of the ECO-POWR™ line of cardio gym equipment. He is a global speaker and writes about mindfulness, leadership and conscious business on his blog at http://ivogrossi.com.

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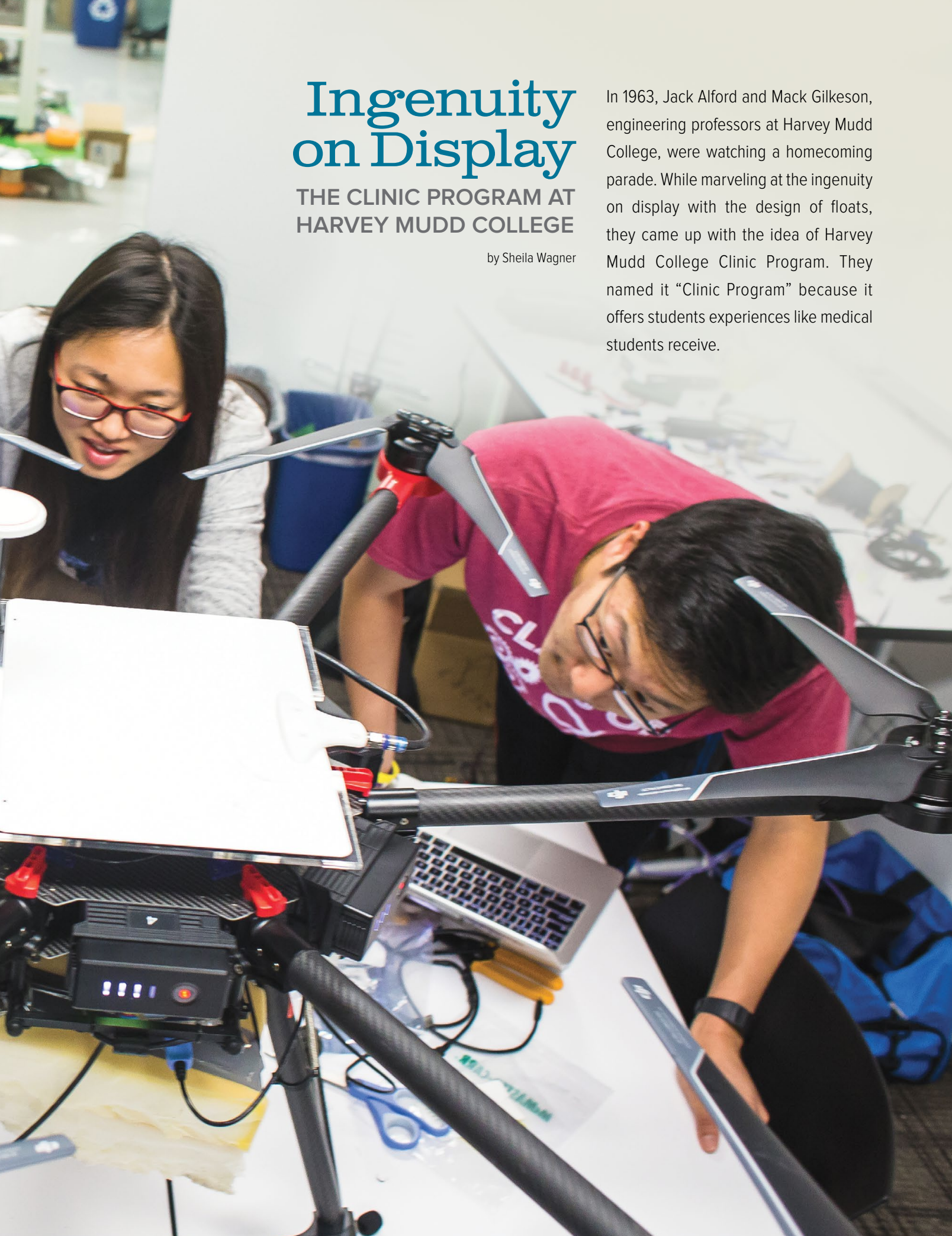
THE CLINIC PROGRAM AT HARVEY MUDD COLLEGE

by Sheila Wagner

In 1963, Jack Alford and Mack Gilkeson, engineering professors at Harvey Mudd College, were watching a homecoming parade. While marveling at the ingenuity on display with the design of floats, they came up with the idea of Harvey Mudd College Clinic Program. They named it "Clinic Program" because it offers students experiences like medical students receive.



Tackling Design and Manufacturing Problems

Over the years, junior and senior engineering students at HMC participating in the Clinic Program have tackled design and manufacturing problems in over 1,600 projects for more than 500 clients, many of them Fortune 1000 companies. This program depends entirely on problems provided by the engineers, scientists and mathematicians at the sponsor companies—the untried problems, the open-ended problems that stretch the imagination, the authentic, complex and messy problems that stimulate creative thinking.

The sponsors retain full rights to all intellectual property developed by the team. Sponsors regularly attest that the fresh ideas and project results have dollar values that far exceed the Clinic fee. Perceived sponsor value is further evidenced by the fact that more than half of the sponsors have returned for additional projects.

Colleen Coxe, Harvey Mudd College Corporate Relations Director, said that the fee is $50,000 in 2018-19. She stated, "The value

sponsoring companies have placed on results can range from preventing a company from investing in R&D that ends up not being productive or feasible, to millions of dollars in patent rights and/or cost savings."

Selecting Strong Teams of Students

Coxe explained that the teams are divided according to the disciplines necessary to complete the project. Sometimes there are teams of just engineering students or computer science students. There are a few teams that are joint between two majors, typically math and computer science, computer science and engineering, or physics and engineering. Students are able to submit ranked choices for projects and then faculty consider the choices in building teams that meet the needs of the project in terms of skill sets. Faculty also consider team dynamics in building the teams, which can be a significant success factor. She continued, "Having the faculty insight provides unique value to the process."

During their Clinic projects, students work in groups of four or five under the guidance of a student project manager (team leader), a faculty

advisor, and a liaison from the sponsoring organization. Projects begin in September, involve about 1,200 to 1,500 work hours, and are completed the following May. The sponsor's liaison outlines the project requirements, approves the team's proposal for accomplishing the work, and receives weekly progress reports. In most cases the student team visits the sponsoring company during the first month. All the teams unveil their findings to professors, friends, families, company liaisons and other sponsor representatives at HMC's annual "Projects Day."

Project for HP, INC.

Nancy Lape, Professor of Engineering at HMC, was the faculty advisor last year of a project for HP, Inc. This company has a new type of printer that uses an electrical charge long enough to get ink to stick to the right parts of a roller so that it quickly and easily switches to different images to make beautiful color prints, unlike the old fashioned way of having to prepare a plate for each individual page. Their printer used lithium salt with the rubber roller to make it conductive, but it leached out after usage.

Lape's team was working on the best way to add carbon black to the rubber that goes onto the roller to hold that charge. It needed to have the right conductive and mechanical properties. In addition, the carbon black needed to spread evenly all through the rubber. Her team explored a lot of different ways to make the samples in the lab-based research. HP is continuing the research and is in negotiation with HMC for possibly continuing the project this year. Lape said, "Our team was able to advise them how they should make their composites with the carbon black and the rubber to get the best performance for the rollers in their printers."

Jacey Coniff, a 2018 graduate from the Engineering Program, who was actively involved in the HP clinic project, gained a lot of useful practice in solving problems in an industry setting and working in a team. She said, "Professor Lape provided us with helpful feedback about project management and technical solutions and aided us in communicating well with our HP liaisons."

Harvey Mudd's Commitment to Intellectual Breadth and Depth

College rankings repeatedly have recognized Harvey Mudd College's commitment to both intellectual breadth and depth. *U.S. News and World Report* ranked HMC number one in 2018

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for undergraduate engineering programs at non-doctoral institutions, as well as number seven for "Most Innovative Schools." *Forbes* magazine also cites the college for its diversity initiatives, in particular engaging women and minorities in STEM majors.

Charles Volk, Vice President and Chief Technologist, Navigation System Division, for Northrop Grumman praised HMC for projects in the last five years. "These symbiotic Clinics give the students a forward look into the execution of a project in the engineering industry and bring open and unfettered ideas into the industry," he affirmed.

Adam Bernstein, Group Leader, Lawrence Livermore National Laboratory has stated, "LLNL has been sponsoring Harvey Mudd College Clinic teams for nearly two decades, and I personally have engaged with the teams nearly every year for the last decade. The students are invariably among the brightest in the country and a pleasure to work with and…meet or exceed the goals we set in our Clinic projects."

ABOUT THE AUTHOR: Sheila Wagner has spent the last several years working as a professional editor and recently became the staff writer for *Private University Products and News*. Wagner can be reached at sheila@pupnmag.com.

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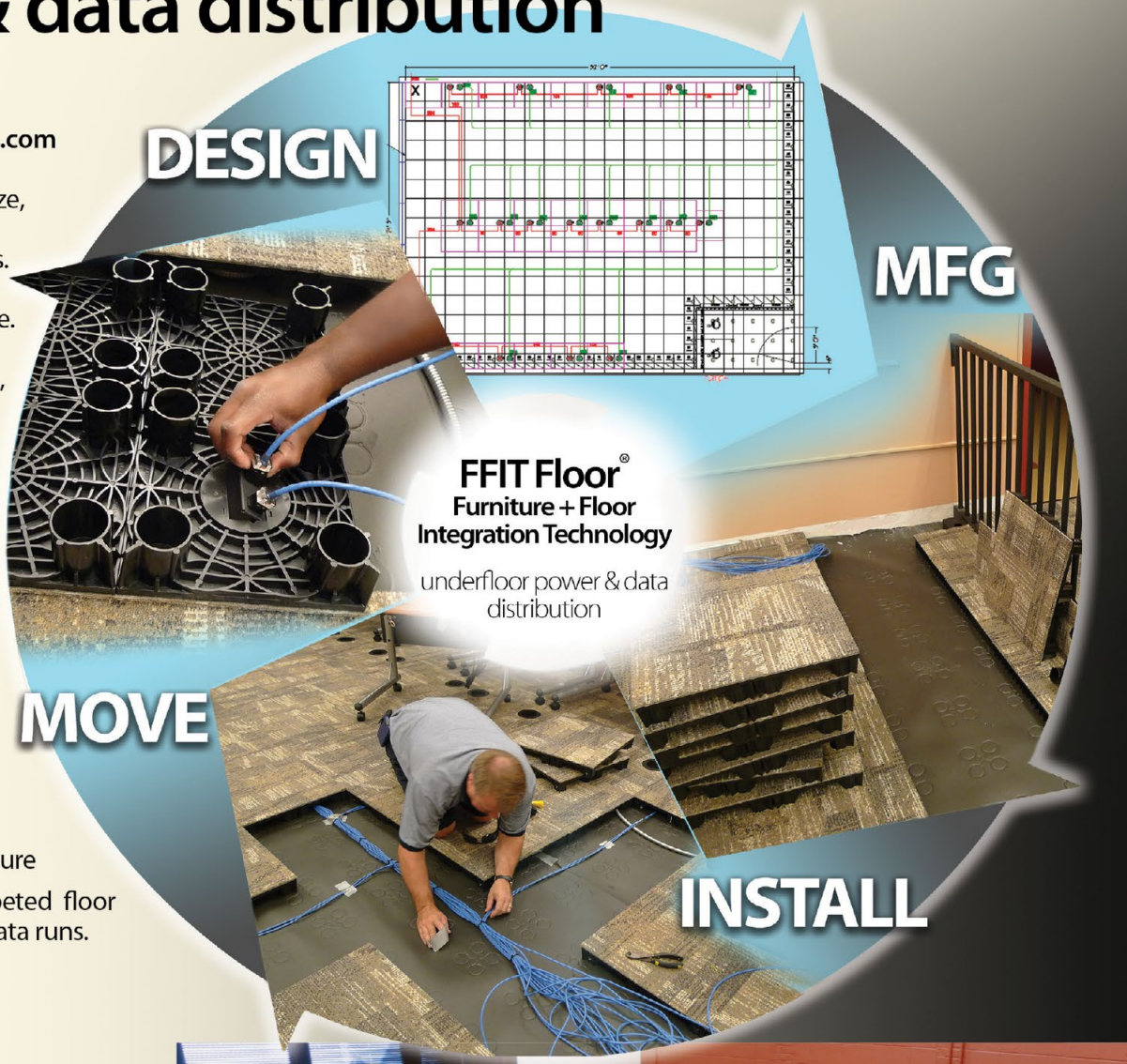

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Sustainable Vacuum System
at Notre Dame

The University of Notre Dame's new McCourtney Hall of Molecular Science and Engineering is a research facility built around the University's vision of multi-disciplinary "research neighborhoods," which would co-locate scientists with overlapping interests. Completed in 2016, McCourtney Hall is a 219,500 GSF building, with 100,000 ASF of open lab and team spaces. Some of the lab space would be assigned to faculty who would be relocated from elsewhere on campus, but 40% of the new lab space was reserved as shell space to be built out as the support needs of recruited faculty were clear.

The university wanted a building in which any type of lab could go on any floor, and in which open labs would encourage interaction as well as provide flexible use of the space. Design firm BSA LifeStructures employed several strategies in order to realize these goals. Mobile casework with overhead delivery of lab services was installed, along with a mix of central and local utilities. Floor plans were designed with flex space that could be easily allocated to lab or support use, depending on the science requirements. Ductwork for supply air and exhaust was sized and manifolded to maximize the number of fume hoods possible on each floor if needed in the future, for example, to support chemistry or chemical engineering.

As Notre Dame considered its plans for lab vacuum, it had to confront its experience with the central vacuum system in another research building on campus. After aspirated solvents had twice damaged the central pumps, with repair costs each time of about $25,000, the central vacuum there was shut down completely in 2012 after the third instance. Based on this experience elsewhere on campus, it was clear that central vacuum was a nonstarter at McCourtney. The architects for the project had prior experience with local vacuum networks at other institutions, and suggested that Notre Dame consider that technology.

Local vacuum networks are a modular approach for supplying vacuum to lab benches, fume hoods and biosafety cabinets. Instead of a building-wide system, vacuum networks are installed only where vacuum is known to be needed. If the work of a particular lab evolves to require vacuum in the future, it can be installed readily at that time. A small oil-free pump installed in the casework or under the fume hoods and the system is plumbed with chemical-resistant fluoropolymer tubing to connect specially-designed vacuum turrets to the pump. Vacuum is installed lab by lab, so it can scale to the demands of the building, but also be put in later in the spaces reserved for later build-out. Previous experience at Notre Dame indicated that a careless operator in one location could compromise the vacuum supply for the entire building. With local vacuum networks, the vacuum in each lab is isolated from the vacuum in the other labs. This not only protects against the loss of a building-wide utility, it also protects against the scientific risk of cross-contamination between labs through the vacuum lines. As exemplified by Notre Dame's prior experience with central vacuum systems, service demands and maintenance costs are critical concerns when evaluating vacuum system options.

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Local vacuum network pump under a fume hood.

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Local vacuum network ports mounted to casework

Upon examination by the spokesmen for the scientists at Notre Dame, the chemistry department head saw the value of the deeper vacuum at the benches and fume hoods. That could potentially eliminate the space demands and equipment costs of lots of dedicated pumps. Both the scientists and facility personnel saw the benefits of a distributed, corrosion resistant system after their prior experience elsewhere on campus. And the fact that the life science labs could have a different vacuum supply that fit their needs while the chemists got what they needed meant that the solution could work for everyone.

It turned out that the installed cost of the local vacuum networks was comparable to the cost of central vacuum, and had the advantage that investment in vacuum supply for the reserved shell space could be deferred until the needs there were clear. Beyond the comparable capital costs and the improved flexibility, the local vacuum approach produces vacuum on demand, so there are material energy savings compared with central vacuum supply. Preliminary measurements of power consumption suggest savings of 55% over a comparable central vacuum system. In addition to low operating costs, maintenance costs are also low – typical service intervals are 15,000 operating hours, meaning that several years elapse between service stops. Servicing a pump takes about 2 hours. If back-up supply is needed for critical operations during service, a service pump can be kept in maintenance stock and switched in to replace the installed pumps in about 15 minutes.

All of these advantages supported the university's decision to rely on the VACUU·LAN® local vacuum networks instead of the traditional fixed vacuum system. Twenty-eight VACUU·LAN® network pumps were installed to provide vacuum at nearly 300 workstations in McCourtney Hall. The pumps create vacuum of 2 Torr – about 29.8 in. Hg – at bench and fume hood ports; this is about 2 orders of magnitude deeper than vacuum typical of central supply. The tubing can be plumbed through ceiling drops with quick-connect fittings, so it was compatible with the flexible layout planned for McCourtney.

Recruitment of the new researchers at Notre Dame has gone well, so that a quarter of the space reserved for new hires was already in the process of build-out within a year of initial occupancy. The modular design approach to the building overall, and the vacuum systems in particular, has enabled the university to quickly fit out this space to the needs of the new principal investigators that have responded to the university's expanded research initiative.

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PREPARING STUDENTS FOR LIVES OF SIGNIFICANCE

AT BIRMINGHAM-SOUTHERN COLLEGE'S BUNTING CENTER

by Hannah Wolfson

On a quiet weekday in the summer with few students on campus, Kristin Harper was working on big plans for the future.

Harper was planning out programs in her role as director of BSC's Bunting Center for Engaged Study and Community Action—programs designed to draw students into meaningful service as part of their academic experience at Birmingham-Southern College.

"There is an urgent need for thoughtful, engaged citizens in our country. Those who succeed in addressing some of society's biggest challenges will be those who can communicate effectively, are willing to understand and appreciate multiple perspectives, and are able to solve problems creatively," Harper said. "We are looking for even more ways to encourage students with a broader perspective and empower them with the skills of engaged learning and dialogue."

The Strength of the Bunting Center

That's the strength of the Bunting Center, which was founded a decade ago thanks to generous support from BSC alumni couple Dr. Peter and Derry Bunting. The Buntings decided to build on the groundbreaking work of former Birmingham-Southern College

Chaplain Dr. Stewart Jackson, who pioneered service learning in the 1980s. Peter Bunting passed away earlier this year; Derry Bunting serves on the BSC Board of Trustees.

Today, hundreds of BSC students get hands-on experience with dozens of community partners from as close as College Hills and as far away as Africa. Some experiences are simple—a chance to help build houses with Habitat for Humanity, or tutor local kids, or to learn about civil rights on an overnight trip to Montgomery. But the real goal is to go beyond basic volunteering to build relationships with community members so that students' world views are expanded and collaborative partnerships emerge to address community challenges together.

To that end, the center has evolved and grown over the years; it is now part of the Krulak Institute for Experiential Learning, Leadership, and Civic Engagement, which provides a "one-stop shop" for students looking to get involved in their community or to travel. Following are some of the exciting programs happening right now.

Poverty Studies

Last year, BSC joined the Shepherd Higher Education Consortium on Poverty, a network of 23 schools committed to integrating the study of poverty with the liberal arts. The membership aligns with BSC's new Distinction in Poverty Studies, which requires participating students to take an introductory course, complete an internship, take two other relevant courses from across the curriculum and a senior capstone in poverty studies.

The Shepherd Consortium connects BSC students to more than 120 internship-granting organizations addressing poverty around the country. Because of this association, the college was able to expand its Hess Fellows program by adding five poverty internships through the Shepherd Consortium. This summer, BSC's first five Hess Poverty interns worked in Charleston, WV; Washington, D.C.; Atlanta; and Baltimore. In addition to the internships, the consortium organizes an annual symposium on poverty and offers staff and faculty development.

Birmingham-Southern's distinction isn't designed to supplant traditional majors, but rather to enhance students' understanding of a wide range of disciplines, where their real-world experiences are likely to intersect with poverty-related issues.

Harper said at BSC, that's likely to mean some students participating will already know they want to focus on solving the complex problems of poverty by going into community development, public policy, public health, and more. But she said it would also help students who plan to be pastors, lawyers, health care practitioners, and more.

"Whatever field of study or career path they choose, exposure to the issues of poverty and to people living in poverty informs our students and encourages active citizenship," she said. "Whether you're going to be a teacher, a business owner, or a doctor, it's important that you understand issues of economic disparity."

Buiga Sunrise School

For the third year in a row, BSC students traveled to Mukono, Uganda, in January to work with the nonprofit school called the Buiga Sunrise School as an Exploration Term experience. The students—a mix of education majors and others—have focused on helping with curriculum development, English teaching, and other services for the local students.

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This year, they were accompanied by Maggie Besh '17, who spent two Exploration terms at the Sunrise School as a student. She's staying on for a full year to help teach English and writing—and also to deepen the relationship between BSC and its African partner.

"Our dream is that Maggie can help us strengthen our partnership by getting to know community members and help us to prepare to bring other groups of students," Harper said. In the future, that could lead to teacher exchanges between Buiga and Bush Hills Academy, the neighborhood school with which BSC has had a partnership for more than 20 years.

Bonner Leaders

The Bonner Leader Program, which was developed by the nationally-known Corella & Bertram F. Bonner Foundation, is a four-year scholarship program designed to provide college access to low-income students who have a passion for community engagement. BSC—the only Bonner campus in Alabama—recruited its first class through the Bunting Center in 2015, with plans to add at least five new students a year. Participants receive a $2,500 scholarship and a community-based federal work-study position; they commit to being engaged in the community 8-10 hours a week throughout their four years at Birmingham-Southern.

"This program enables us to reach out to high school students who are committed to community engagement and attract them to BSC," Harper said. "The idea is that they try out lots of community partners their first year and then choose one or two to get involved on a deeper level."

Current students have taken on coaching youth teams for Northstar Soccer Ministries, a local program that brings soccer into low-income urban neighborhoods; raising awareness and funds for Red Mountain Park; and working with the Blueprints College Access Program through the anti-poverty group Alabama Possible.

Like the Shepherd Consortium, joining the Bonner community connects BSC to a network of about 70 schools across the country and offers additional resources for faculty, staff, and students.

Service-learning Courses

In addition to specialty programs, Harper says one of the greatest areas of growth has been BSC faculty integrating service learning into their courses or into rise3 experiences for students. Much service learning happens in areas where you'd expect it, like poverty studies, public health, education, and sociology.

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But others think outside the box. Medicinal chemistry includes a public service project, requiring students to communicate with the public on a chemistry-related topic; last year's focused on the proper dosing and disposal of medication. A course called "Theatre's Call to Action" sent students to Bush Hills Academy to interview teachers and create a drama about their professional lives, which they then performed at the school. And a project in history captured the stories of those who lived through the civil rights-era bombings in the nearby Smithfield neighborhood, then dubbed "Dynamite Hill."

"We've made a real effort to work with faculty to adopt criteria for service-learning designated courses, which are now identified in the college's catalog," Harper said. "We have always had a handful of service-learning courses. With the development of the rise3 program, we are able to increase not only the quantity of service-learning courses, but also the quality."

ABOUT THE AUTHOR: Hannah Wolfson is Director of Communications for Birmingham-Southern College in Birmingham, Alabama.

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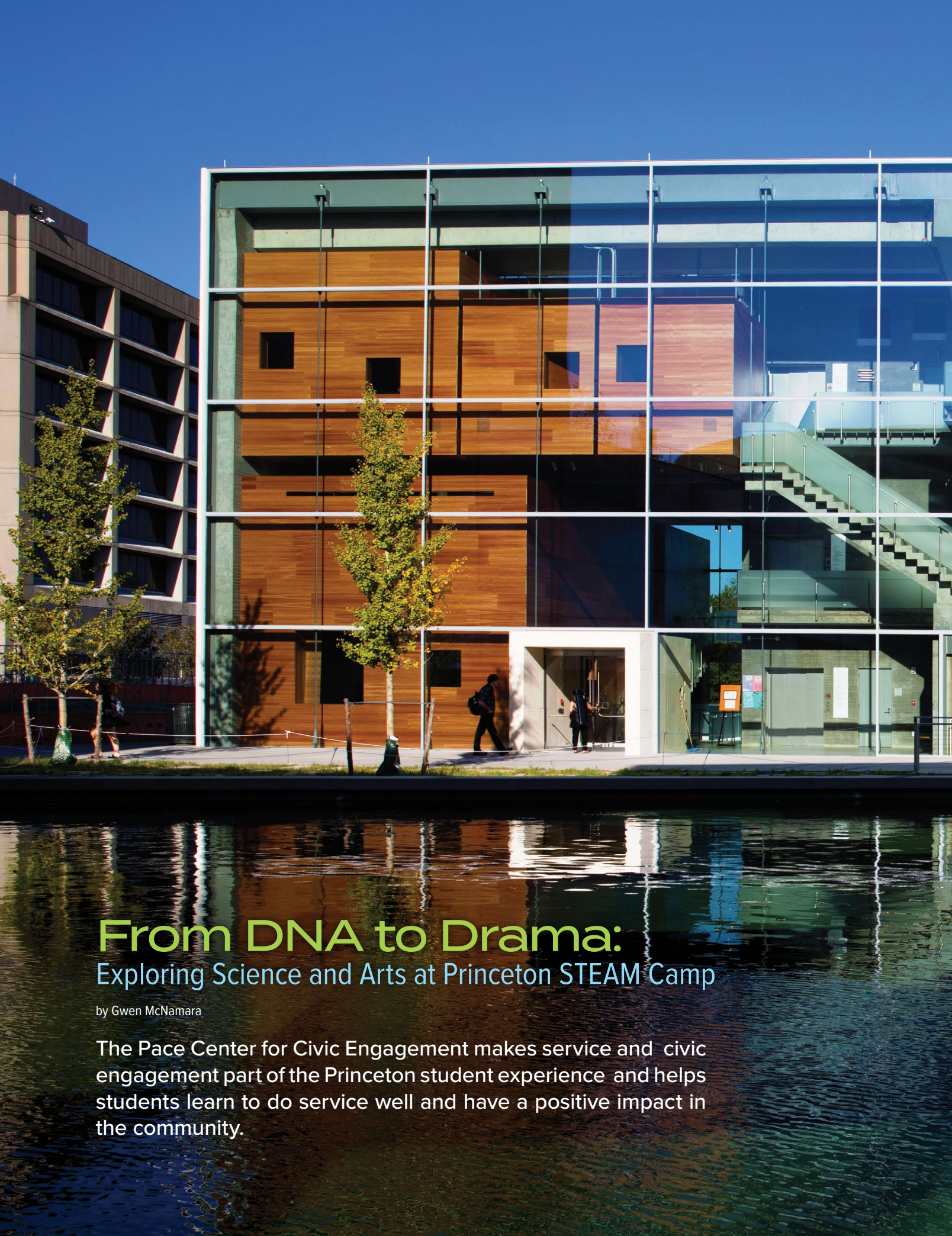

From DNA to Drama:

Exploring Science and Arts at Princeton STEAM Camp

by Gwen McNamara

The Pace Center for Civic Engagement makes service and civic engagement part of the Princeton student experience and helps students learn to do service well and have a positive impact in the community.

Photo courtesy Princeton University, Office of Communications

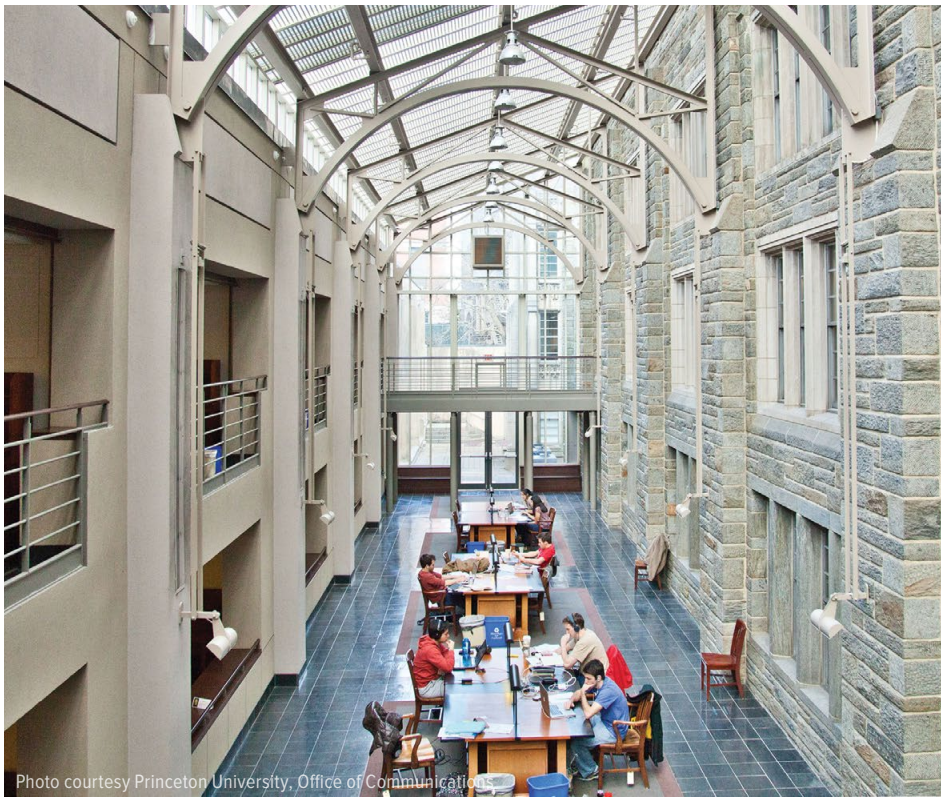

Photo courtesy Princeton University, Office of Communications

Through sustained volunteering, community immersion, student advocacy and activism, summer internships and post-graduate fellowships, the Pace Center guides students as they learn to be well-prepared for service, to be intentional about the work they do, and to reflect thoughtfully about the service in which they engage.

Pace Center Strategic Plan

Service and civic engagement at Princeton is unique. It is driven by students and manifests itself in many ways across the University. It happens in the classroom, in athletics, in career exploration, and in student advising. It happens in identity exploration, in campus activism, and in the community. And it wouldn't happen without our many dedicated students, friends, colleagues and partners.

Both staff and students will use this plan to guide our efforts, to make decisions and to act. It will help us enhance and expand programs, better support students and advance partnerships with communities. We are energized and excited for what's ahead as we live "in the nation's service and the service of humanity."

Princeton STEAM Camp

Channeling a little bit of Dr. Frankenstein, six middle school students are building monsters with Princeton University senior Tyisha Griffiths. With each flip of a coin they reveal which dominant or recessive traits their monster will have as part of a hands-on genetics lesson.

"Heads!" one student calls out. "OK so what genotype will that be?" Griffiths asks. "Allele 1, two small eyes," a student replies. "Great! Let's do the next one," Griffiths responds. Soon a monster with red eyes, blue skin and a curly tail emerges. "This is going to look so gross!" another student exclaims.

Community House

Community House STEAM Camp is a free science and arts exploration summer camp open to underrepresented middle school students in the Princeton area. The long-running program is one of Community House's 16 student-run projects with the Pace Center for Civic Engagement. Developed and facilitated by Princeton University undergraduate

Photo by Mark Czajkowski


Photo by Mark Czajkowski

students, graduate students and alumni volunteers, STEAM Camp runs for six weeks, July 5-Aug. 3.

This year, 32 middle school campers are taking part, enjoying action-filled lessons, experiments, activities and field trips oriented around such themes as "an exploration of biology and performing arts" or "an exploration of chemistry and creative writing."

"I like science because it teaches me about life," said Joshua Raymond, a 12-year-old student from Princeton heading into the seventh grade at John Witherspoon Middle School. "So far my team has worked on building a boat out of cardboard and before that we made an egg project to see if we could build something to keep an egg from breaking. We're even creating our own movie."

Interactive, Hands-On Experiments and Projects

Lessons in everything from the periodic table to journalism and ecosystems seek to inspire a love of learning, strengthen students' skills and prepare them for the coming school year. The middle school students learn through interactive

and hands-on experiments and projects that build their teamwork skills.

"The activities we do are a fun way to learn," said Lea-Jade Richards, a 12-year-old student heading into seventh grade at Princeton Day School. "Camp really helped last year when I was going into sixth grade. We learned about Punnett squares and DNA so I had a head start during the year."

Founded by Princeton Undergrads in '69

Founded by Princeton University undergraduates in 1969, Community House works with families to support underrepresented youth. STEAM Camp supports Community House's mission of providing tools for academic success and enhancing social and emotional literacy.

"At Community House we take a holistic approach to youth development work," said Charlotte Collins, associate director at the Pace Center. "The goal is to provide programming rooted in experiential learning that supports academic readiness and building meaningful connections."

Photo courtesy Princeton University, Office of Communications


Photo courtesy Princeton University, Office of Communications

Benefits for Princeton Students

For the counselors, STEAM Camp offers a chance for them to share their passions for the subjects they're studying at college and gain new understanding and experience as they work with local youth.

"It's been really interesting to live from the teacher's perspective," said Sultaan Shabazz, a Princeton sophomore studying operations research and financial engineering. "To see what it's like to give a lesson, lead a class, work with the kids and get the best out of them is really eye-opening and rewarding."

Ayesha Qureshi, a senior at Rider University studying elementary education, agrees. "I really like the connection you have with the kids," she said. "It's the best feeling in the world when they learn something and they repeat it back to you and it all comes together."

Generation One

Qureshi took part in Generation One, a Community House service project that helps students navigate the high school experience and prepare to launch into college. As a STEAM Camp

counselor, she says her "Gen One" experience not only enabled her to be more successful as a first-generation college student, but also prepared her for the nuances of working with middle schoolers.

"I remember what it was like to be that younger kid, not always wanting to listen or pay attention," she said. "And I remember how our Princeton University mentors worked with us. They really were good role models."

Alex Pirola, a Princeton sophomore studying mechanical and aerospace engineering, loves that STEAM Camp combines the sciences and the arts.

"I'm an engineer, but I also love people and working with others," he said. "(Camp) breaks some of the common misperceptions of scientists and engineers. I love that I can bring and share other parts of myself. I'm an engineer, but I also can write lyrics and make videos."


Photo by Mark Czajkowski


ABOUT THE AUTHOR: Gwen McNamara is Communications Coordinator for Pace Center for Civic Engagement at Princeton University.

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