

A collaboration between
St. Olaf College and the
Mayo Clinic's Office of
Intellectual Property
offers students an applied-
learning experience at
the interface of science
and business.

Business





at Hand

By Marla Hill Holt '88

PHOTOGRAPHS BY TOM ROSTER

MOST ST. OLAF STUDENTS took one of more than ninety on-campus courses offered during Interim this past January. Some learned to speak Norwegian. Others studied musical acoustics in the physics department or read modern Chinese literature. They spent an hour or two in class each day, a fair amount of time studying outside of class, and a few more hours inventing creative ways to survive another frigid Minnesota winter. Perhaps some even wished they'd have signed up for one

of the twenty-five international programs St. Olaf offers during Interim, maybe studying equatorial biology in Ecuador or the indigenous cultures of Australia.

But for eight talented juniors and seniors, Interim was spent immersed — for up to sixty hours a week — in the Mayo Innovation Scholars Program, an experiential, interdisciplinary learning opportunity that engages science and economics majors at select Minnesota private colleges in evaluating the commercial potential for inventions and discoveries by Mayo Clinic physicians and researchers.

“I had previously taken a laid back approach to interim and it worked out well,” says Scott Crider '10 of Downer's Grove, Illinois. “But I wanted something more challenging, and Mayo Scholars was by far the most comprehensive project I've ever done from beginning to end. It was incredible.”

TEAM DYNAMICS

ST. OLAF ALUMNUS JOHN MESLOW '60 founded the Mayo Innovation Scholars Program, now in its third year, in 2006. It is a collaborative effort among the Mayo Clinic, the Medtronic Foundation, and the Minnesota Private College Council, which currently involves students and faculty members at eight private colleges in the state: St. Olaf, Carleton, Macalester, Gustavus Adolphus, Concordia-Moorhead, St. Mary's, Saint Benedict's, and Saint John's. Small teams of undergraduates, usually drawn from biology, chemistry, physics, mathematics, and economics majors, research and evaluate new medical technologies, devices, and ideas submitted to the Mayo Clinic's Office of Intellectual Property. The teams are led by MBA students from the University of St. Thomas and Augsburg College and mentored by faculty members and Mayo licensing managers.

This year's student scholars evaluated a wide variety of technologies, ranging from a prostaglandin pathway gene therapy for glaucoma and a device to measure thrombin generation in blood and plasma to Cofilin-1 as a biomarker for assessing heart failure and a new use of a generic drug to treat psoriasis.



The Mayo Innovation Scholars Program engages science and economics majors at select Minnesota private colleges in evaluating the commercial potential for inventions and discoveries by Mayo Clinic physicians and researchers. This year's scholars included (PRECEDING PAGE, FROM LEFT): Nicole Boczek '10, Jake Busch '09, Marija Lum '10, Wendell Spence (St. Thomas Opus College of Business, MBA student '09), Carmen Cummings '09, Andrew Schwartz (St. Thomas Opus College of Business, MBA student '09), Sarah Forrest '09, Professor Kevin Crisp, Anna Larson '10, Nate Black '09, and Scott Crider '10.



St. Olaf College's two student teams — each made up of four students — were responsible for evaluating a newly designed electrode lead for intramyocardial pacing devices and an improved temporomandibular joint (TMJ) fossa-eminent metal prosthesis.

The students' first task is to learn about and understand the scientific complexities of the technology. They also perform a market analysis for the product, ultimately determining its commercial potential. Their investigative path often leads them to grasp such intricacies as FDA regulations, patent law, and clinical trials.

Kevin Crisp, assistant professor of biology and faculty adviser to St. Olaf's Mayo Innovation Scholars, calls the program the "real deal." The students are tackling a real-world problem at the intersection of science, medicine, and business — an area into which most liberal arts students haven't ventured before.

"One of the interesting things that happens, especially with pre-med students who have gone through the program," Crisp says, "is that they gain a better understanding of the economics behind medicine. They get a realistic look, although it's microcosmic, at how medical innovation is financed."

According to Crisp, the economics students delve into the science of medical technology and get real exposure to the medical device arena. "This is fantastic for them," he says, "because more than three quarters of the biobusiness technology jobs in Minnesota are in medical devices, and this program helps our students be competitive in that job market."

The Center for Experiential Learning helps students "live their learning" by creating experiences that involves them in meaningful real-world projects and by ensuring that faculty are involved at all stages of the process. The Mayo Innovation Scholars Program is a great example of this type of initiative, says CEL Executive Director Bruce Dalgaard.

LEADING ROLES

THE ST. OLAF MAYO INNOVATION SCHOLARS spent January in Regents Hall of Natural and Mathematical Sciences in two separate conference rooms outfitted with the tools they needed to accomplish their research: computers, phones, and whiteboards. The scholars program is an academic internship at St. Olaf, so the students receive one full-course credit for their work. They also receive a modest stipend from the Medtronic Foundation, which also provides funding for the overall program. Expenses related to student research are reimbursed by the Mayo Clinic.

Prior to the start of Interim, the students receive a general description of the technology they will evaluate and a brief list of project deliverables, such as learning if there are any advantages to the technology, identifying potential licensees, and performing a SWOT (strengths, weaknesses, opportunities, and threats) analysis. During fall semester, they meet with an assigned licensing manager from Mayo's Office of Intellectual Property and when possible, the inventor, to gather more information about their project. The students are not, however, given a how-to manual.

"There is a certain degree of ambiguity in these projects, and that's built in purposefully," Crisp says. "We tell them what they are supposed to do but not how to do it. We want them to be creative in flexing their muscles in multiple disciplines. Liberal arts students engage regularly in analytical thinking and creative problem solving, so when they are presented with a problem that is amorphous, they're willing to find out whatever they need to know to make decisions."

This ambiguity can lead to some initial anxiety among the student scholars, who sometimes wonder how their particular skill set will work with the overall team. Due to the interdisciplinary nature of the program, the students usually come from a variety of majors and often have not met before. But it doesn't take long for these qualified and resourceful St. Olaf students to figure out what strengths they bring to the table.

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Senior physics major Cullen O'Neill was a Mayo Innovation Scholar in 2007–08 and worked on a team that evaluated a distal interphalangeal ring splint for mallet finger injuries. At the outset, he wasn't sure how his physics background might be helpful.

"I'm not a marketing guy," he says. "My biggest question, going in, was 'what am I going to bring to the group?' It seems like the program would be a better fit for chemistry and biology majors. But I was able to start on the operations research right away, and from there it just flowed."

O'Neill settled into calling manufacturing companies, gathering data on other splints currently available in the market. He created an equation that predicted the per-piece manufacturing cost for the new splint based on labor and materials costs. From that data, his team was able to make some profit predictions to present to Mayo. O'Neill discovered that he was a good team leader, able to bring people together toward a common goal.

"This was such a unique environment to work in," he says. "We were four people with different majors and perspectives coming together for a single project. I learned I could both delegate well and synthesize large amounts of information. I also realized that my analytical mind — how I've been taught to problem solve — was the biggest strength I brought to the group."

Other students admitted the program pushed them beyond their comfort zones. Scott Crider, an economics major who worked on the intramyocardial pacing project, says his first

duty was learning everything he could about the human heart and its electrical conductive system.

"I've done market research before, so I wasn't too worried about that aspect of the program," says Crider, "but the first week or so I had to learn how the heart works beyond my basic knowledge of it having four chambers. The amount of science learning I did was pretty intense."

Crider had worked on a new product launch at a previous internship, so he brought his knowledge from that experience to bear on the Mayo Innovation Scholars project. "I knew we needed to understand everything we could about the customers — in this case the heart patients — and what their needs are and if this technology would help them," he says.

According to Crider's fellow scholar, Anna Larson '10, the intramyocardial pacing team's first challenge was understanding the technology and then familiarizing themselves with other electrode leads — wires that attach the pacing device to the heart — currently available on the market. Coupled with their knowledge of patients' needs, Larson says, "we were able to compare and contrast whether this new electrode lead would actually be more beneficial to patients."

For Larson, who is majoring in chemistry and Spanish with a biomedical studies concentration, the Mayo Innovation Scholars experience expanded her view of the practice of medicine. "It gave me a greater appreciation for the diverse opportunities offered by the medical field," she says. "I now am more comfortable with the fact that medical school might not be the best path for me because I know that there are various



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The student scholar teams presented their final recommendations in a formal meeting at the Mayo Clinic in March. The information they provided is a valuable tool for Mayo licensing managers as they make their final determinations about the technologies.

other ways of helping to improve the health of patients. In fact, some of these alternative options, such as biomedical engineering or pharmacy, may suit me even better than would pursuing an MD degree.” Larson emphasizes that she is still undecided about her future but appreciates the program for exposing her to other choices.

Nicole Boczek '10, a biology major with a management studies concentration, was the only junior in the scholars group evaluating the TMJ prosthesis. She initially worried that being younger than her fellow scholars would be a disadvantage. But again, like other scholars, she was able to balance a perceived weakness with the strong skills she provided.

“I wasn’t sure how the others would view me,” she says. “But this experience was a confidence builder for me. I learned that I’m knowledgeable enough to fully participate, that I can challenge others, that I shouldn’t worry that my ideas aren’t worthy.”

“We worked well together as a team,” says Nate Black '09, who also worked on the TMJ prosthesis project. “In this case, the sum definitely was greater than the individual parts.”

Black, an economics and math major, also valued the cross-pollination that, by nature, is part of any interdisciplinary endeavor. “We had to teach each other about our own parts of the project, and in teaching each other, we learned more. For example, in making a licensing decision, what I was doing might not have been clear to Nicole. I’d have to reason through my process in explaining it to her, and maybe I’d find a flaw in my reasoning. Having that different perspective helped me rethink some of my decisions and sometimes pushed me to bring in new pieces.”

These are exactly the type of interactions Crisp hopes the Mayo Innovation Scholars will experience. He has been St. Olaf’s faculty adviser to the program since its inception, and each year he carefully chooses the technologies the students will investigate from a list provided by Mayo’s licensing managers.

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SUSAN STODDARD, MAYO CLINIC

“I look for the simplest project, knowing that invariably, it will turn out to be incredibly complicated,” he says. “Choosing the most cutting-edge, save-the-world technology would be a bag of hidden nightmares for the students. There are so many nuances to bringing a medical device to market, that even something as seemingly clear-cut as a nasal clip to block snoring is very challenging.”

Patricia Smith, director of St. Olaf College’s Center for Experiential Learning, which oversees the Mayo Innovation Scholars Program, helps Crisp select the student participants each fall based on the strength of their written applications and personal interviews. Keeping in mind the technologies the students will be evaluating, Crisp and Smith build teams with complementary skills that are particularly well suited for each project.

“Majors in economics, the natural sciences, and math are the primary candidates,” says Smith. “Sometimes we need a student with a strong anatomy and physiology background or one with statistics knowledge. It all depends on the project they’ll be working on.”





For Crisp, it's equally important to consider students' leadership styles: "In order to be successful, the team needs to get effective dialogue going from day one," and having well-matched students certainly facilitates that, he says.

ADDING VALUE

JOHN MESLOW '60, A RETIRED MEDTRONIC EXECUTIVE and former board member of the Minnesota Private College Council, first voiced the idea of bright college students working in collaboration with the Mayo Clinic several years ago in a conversation with Steve VanNurden, director of Mayo's Office of Intellectual Property (then known as Mayo Medical Ventures). VanNurden oversees eleven licensing managers who have an intensive case workload: They receive at least one new innovation — medical device, diagnostic tool, or pharmaceutical — from Mayo physicians and researchers every day, which accumulates to several hundred active case files waiting for evaluation on each licensing manager's desk.

Meslow's idea, with which VanNurden agreed, was to use undergraduates in an intensive academic program to help evaluate the market potential of Mayo's innovations. Meslow approached several private colleges, where the idea was met with keen interest, and the Mayo Innovation Scholars Program blossomed from there, growing from four partner colleges the first year to eight this year. The MBA students add an additional layer to the program, providing leadership in their roles as consultants and advisers.

"We use the undergraduates as resources to do basically the same work that we do — to look into these technologies and discover how they fit in the marketplace. Their mission is to tell us the correct commercial path, if there is one," says Susan Stoddard, a Mayo Clinic licensing manager. "There's no question that what they are providing is valuable to us. The other value to Mayo is offering an educational opportunity for these students that wouldn't be available elsewhere.

"Having a broad, applied experience, with an organization of Mayo Clinic's stature, in tying together the theoretical part of their education and the practical side of the workplace is a wonderful opportunity for the students," says John Meslow '60, a retired Medtronic executive and former board member of the Minnesota Private College Council, who directs the program.

And it's been a delight to work with the undergraduates. They bring such a fresh perspective."

And while the students must start their investigations at a base level — after all, they're undergraduates, not MDs or PhDs like the licensing managers — they end up being experts on the technology they've researched so well. They've also learned how business and science interact through a truly interdisciplinary, hands-on learning experience that fits well with the liberal arts.

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In March, to end the program, the student scholar teams present their final recommendations in a formal meeting at the Mayo Clinic. The students, who have written a twenty-to forty-page research paper and prepared a PowerPoint presentation, are given forty-five minutes to present their research and business plan, followed by a fifteen-minute question-and-answer session. Up to eighty people, including all of the student teams, faculty advisers, MBA students, licensing managers, Meslow, and select Mayo physicians and executives attend the two-day event. The information provided by the students is the property of Mayo and becomes a valuable tool for the licensing managers as they make their final determinations about the technologies.

The experience certainly opens doors as students enter the job market or go on to graduate school. O'Neill, who will enter the University of Minnesota's structural engineering program next fall, says the skills he honed for the final presentation at Mayo came in handy during graduate school interviews, and he is convinced his strength as a team leader will shape his future. "As a structural engineer I'll be required to work side by side with architects and contractors and to lead those teams," he says. "I know I can handle those situations because of Mayo Scholars. It was such a unique opportunity, and I'm so glad I was able to take part in it."

Crisp says students who are Mayo Innovation Scholars learn an important life lesson: nothing is really simple. "It's wonderful for our students to tackle a complex, real-world problem," he says. "I hope through this understanding of the complexity of problem solving and through an appreciation for how resourceful you have to be to be an effective problem solver, they mature in their understanding of how the world really works." 🦋

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