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Teaching Students to Care

STEM, plus humanities, plus real-world problem solving is one formula for engaged and empathetic future leaders.

By Karla Hignite

In 1970, Worcester Polytechnic Institute (WPI), Worcester, Mass., pioneered a new undergraduate academic approach aimed at synthesizing classroom learning and robust project-based experiences. Specifically, projects during their junior year encourage students to consider the intersection of their science or technology discipline with human needs and social challenges.

For this experience, a majority of WPI students spend time off campus at one of the institute’s 40-plus project centers around the world. As seniors, students tackle projects that require them to draw from all their previous learning and apply that knowledge to solving a problem specific to their field of study.

Along the way, WPI students complete a humanities and arts requirement, similar to a minor, explains Rick Vaz, director of WPI’s Center for Project-Based Learning and former dean of interdisciplinary and global studies. “In truth, this is a major reason many students want to come to WPI, because they get the opportunity to pursue their technical discipline, while also exploring interests they have in art, music, theater, architecture, language, literature, or history,” says Vaz. “This adds a rich layer of creative expression to their subject expertise and analytic thinking skills.” Read also “Deliberate Dialogue” beginning on page 20.

The Great Debates
Ten years ago, WPI further enhanced its project-based curriculum with the launch of its Great Problems Seminar program, providing first-year students with an opportunity to engage in research through the lens of pressing global challenges, such as human health, food, energy, and sustainability, notes Art Heinricher, professor of mathematical sciences and dean of undergraduate studies.

While students were initially interested in technical topics, more recently they have shown increased interest in exploring social issues, says Kris Wobbe, associate dean of undergraduate studies.

According to Wobbe, about 30 percent of WPI’s first-year students routinely enroll in the seminar program, with participation continuing to inch upward. “Currently, we are close to capacity and are busy growing the number of faculty members who support the program.” Part of the impetus for the program was recognizing that students wanted to get involved in problem solving as early as possible in their college careers, says Wobbe. “We also recognized the importance of laying the groundwork to help students understand how to work in teams so that they are prepared for that level of interaction in their future project work.” Faculty also spend time modeling for students how to engage in civil discourse with their team members, says Wobbe.

Involvement in the program has also become the catalyst for several student organizations. As one example, a team that was concerned about food waste researched WPI’s food stream and determined that enough leftover meals from the campus dining hall and from local restaurants could instead be collected to donate to area shelters, says Wobbe. The campus now has a student-run food recovery network with which any WPI student can volunteer.

Impacts of Engagement
In 2011, Vaz initiated a survey to assess the impacts of WPI’s project-based curriculum. By that time, 20,000 students had graduated from WPI since the institution had switched to its current academic approach. The multiphase study—including a survey and in-depth interviews of alumni and employers—explored impacts


Students from Worcester Polytechnic Institute work to establish a long-term system for monitoring microplastic pollution in Port Phillip Bay, Australia.

of the junior- and senior-year project experiences. Responses reflected a wide range of potential benefits to professional careers and personal lives.

One finding in particular caught the attention of Vaz. Alumni who participated in an immersion experience off campus cited greater benefits than those who hadn’t in 33 of 39 potential benefits asked about in the survey. When these data were shared with the new president, she was quick to inquire what it would entail to allow all students to engage in off-campus projects.

“While we already had a fair amount of aid set aside to help cover the additional travel and housing costs associated with off-campus experiences, we decided to step up funding to increase the number of grants we could provide for this signature program,” says Vaz.

Plans are underway for a campaign to raise the permanent resources needed to stabilize this funding source. One likely donor source is alumni, says Vaz. “We launched these off-campus projects more than 40 years ago. Many of our alumni who benefited from these experiences years ago are nearing the end of their professional careers and want to provide that opportunity to a new generation of WPI students.”

Recently, the institution formally announced its Global Projects for All initiative. Starting with the class of 2022—those arriving on campus in fall 2018—every full-time, degree-seeking student will receive a Global Project Scholarship with a credit of $5,000 to defray costs related to these off-campus projects.

The Faculty Imperative

Important to bear in mind is the role of faculty in a project-based curriculum, says Vaz. “If you want students to be successful in their project-based work, you need faculty committed to this style of teaching.” That requires preparing faculty not only to be experts in their disciplines, but also to guide students to work in teams tackling interdisciplinary problems.

As director of WPI’s Center for Project-Based Learning, Vaz has advised faculty and administrators from nearly 100 colleges and universities of all types and sizes. The center’s signature three-day Institute on Project-Based Learning provides a kind of crash course in different approaches institutions can take to develop and implement project-based learning in line with each institution’s unique culture. “None so far is trying to do something on the scale we have,” says Vaz. “Some may want to start a first-year program or develop a capstone or an honors program. We’ve developed lots of models and tools for these and other program options.”

Many institution leaders today are looking to infuse their curriculum with student experiences that provide them with transferable skills and abilities, including strong communication and collaboration. “Project-based learning is one of the best ways to do this,” says Vaz.

No Hypotheticals

“Our students come here excited about solving problems, and everything we do in our curriculum is fundamentally geared toward that,” says Vaz. The key to the power of WPI’s approach is providing authentic problems to solve. “When these challenges are presented by community organizations or other external parties to the university, the problem becomes embedded within a real cultural, social, and economic context, with actual implications for stakeholders. Students have to learn how to navigate all the moving parts in public and private sectors in order to solve the problem.”

In that regard, WPI’s curriculum helps raise students’ awareness of their role as citizens and the way that a civil society is supposed to work together with community members, government, and the private sector to bring about change, notes Vaz.

This is also a theme running throughout WPI’s Great Problems Seminar, suggests Heinricher. “In order to come up with a good solution to a problem, you
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first have to understand the context of that problem and its connection to civil society.” And, with their humanities and arts requirement, even as students are becoming experts within their disciplines, they are also learning to apply their whole-brain thought processes to solving real problems, adds Heinricher.

One important aspect of that learning is recognizing that the solutions students come up with can’t be dropped in on a parachute. “You have to build a response that actually fits with the local community’s culture and politics, and positively benefits those involved,” stresses Heinricher. “Many students quickly come to realize that solving real human challenges is more difficult than any engineering course they will take.”

Compared to the rest of their generation, WPI students are no more or less political than their peers, but by the time they graduate, most are keenly aware of the complexity of social concerns and are eager to get to work addressing those challenges, argues Vaz.

He points to the results of the 2011 survey of alumni indicating that graduates of WPI’s project-based curriculum develop a high sense of confidence about their capacity to effect positive change in the world. “Their college experiences will continue to play out in their lives and careers in different ways over time, but there is evidence to suggest that giving students an increasing set of real-world challenges to tackle really does produce graduates who believe they can make a difference, who want to make a difference, and who have the skills to do just that.”

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