Making Changes
A professor from a small college in Massachusetts devotes himself to expanding awareness of computational curriculum for his colleagues and his students.

"My introduction to computational science has been career changing," says David Toth, Assistant Professor of Computer Science at Merrimack College in North Andover, Massachusetts.

Toth was first introduced to Computational Thinking in the summer of 2009 during a weeklong workshop at the University of Arkansas. The workshop was one of a series conducted by the National Computational Science Institute (NCSI) and sponsored by the Supercomputing Conference (SC) '09 Education Program, the Blue Waters Undergraduate Petascale Education Program, and Shodor, a non-profit research and education organization dedicated to the advancement of science and math education. "I was blown away by that event," Toth says. The experience led him to participate in the SC09 Conference and the Education Program in Portland, Oregon.

Toth felt it was important to share what he was learning with his colleagues from Merrimack. In early September 2009, Bob Panoff, Executive Director of Shodor and NCSI, was invited to Merrimack to give a talk to undergraduate students and to hold small group meetings with faculty. That visit and talk were very well received by the Merrimack faculty and students, who represented a variety of fields spanning the range from chemistry, physics, and biology to mathematics and computer science.

Following this successful initiation into high performance computing for the Merrimack faculty, Toth assembled a three-person team with faculty members from the biology and mathematics departments to attend the November SC conference with him. Mark Birnbaum, a professor in the biology department, was so excited about the experience that he is now working to develop topics for his courses, and Brandy Benedict, a mathematics professor, is incorporating SAGE, an open source Python-based mathematics software system, into her classes.

Subsequent to the SC conference, Toth has given computational science and engineering talks, as well as presentations on the potential for impacting computer science. He was the local host and coordinator for a summer 2010 NCSI workshop, which included more than twenty faculty from as far away as Spokane, Washington, along the eastern seaboard from South Carolina to Massachusetts, and a number of faculty from Merrimack. Said Dean Josephine Modica-Napolitano, a noted biologist, "The workshop was informative and exciting. Computational thinking can be a powerful learning tool, and I encourage our science and engineering faculty to incorporate it in their classroom and laboratory instruction."

These activities have motivated faculty in the Biology Department to develop plans to introduce computational thinking into their courses. Some of the mathematics faculty are now using SAGE in their classes to introduce computational methods, and Michale Bradley, a professor in the Mathematics Department, is incorporating some of the interactive activities from Shodor into his Discrete Math course. Bradley says, "The Shodor activities allow my students to actively engage with mathematical models and computer simulations of complex situations. They can ask ‘what if’ types of questions, collect and analyze data, and experience computational thinking first hand."

With the support of Merrimack faculty, Toth is now working with his colleagues to introduce a computational thinking course on campus. And Merrimack faculty plan to attend the SC10 Conference in New Orleans, Louisiana to extend their learning experience and to help accelerate their planning for introducing computational methods into their curriculum.

Toth says that the SC conference is a great event for motivating faculty and students. Further, the weeklong workshops in the summer are critical for providing faculty with the necessary foundations to allow them to tackle integrating computational thinking into their courses. "The value of the SC conference resources to support computational science education is invaluable, and I am working to spread the news among faculty as far and wide as I can," says Toth.

Relevant links:
- Merrimack College: http://www.merrimack.edu
- LCI: http://www.linuxclustersinstitute.org
- SC Conference: http://sc10.supercomputing.org
- NCSI: http://www.computationalscience.org
- Shodor: http://www.shodor.org