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A Vital Advance

CONNECTING WOMEN RESEARCHERS WITH THEIR PEERS AND AMERICA'S FUTURE

For years, Civil and Environmental Engineering Professor Sima Bagheri worked alone, using remote sensing data gathered for her by NASA to analyze the quality of New Jersey's water supply. Across the NJIT campus in the Department of Mathematical Sciences, Associate Professor Eliza Michalopoulou worked alone as well, creating new mathematical tools to analyze sound as it passes through the earth's oceans.

One day, almost by chance, the two researchers met over lunch at the Newark Museum, along with a third colleague, Professor Lisa Axe, an environmental engineer interested in how contaminants interact with sediments in coastal estuaries. Before the three women had finished dessert, they realized that they had something in common (water!), and an exciting interdisciplinary research collaboration was born, integrating new statistical modeling methods with remotely sensed water-quality data and in situ measurements in the Hudson-Raritan Estuary.

In 2006, Axe, Bagheri and Michalopoulou were the first team of researchers to receive funding through NJIT's three-year ADVANCE Institutional Transformation Grant from the National Science Foundation. Integrating new virtual networks with old-fashioned face-to-face networks, NJIT ADVANCE uses a variety of strategies to interconnect women researchers in science and engineering to each other, to their male peers, and to female counterparts in industry and government. The goal is to ensure that meetings like the one at the Newark Museum happen much more frequently, and not by chance.

PHOTO: KAI CHAN

ADVANCE addresses the most serious problem facing women in science and engineering, at NJIT and across the country: isolation. Although women are the majority of the U.S. population and nearly half of the U.S. workforce, at top research universities barely three percent of full professors in engineering, computer science and physical science are women. Because their numbers are so small, women science and technology faculty often find themselves positioned on departmental islands, disconnected from each other and from the mainland of academic life. And because they are isolated, it is much harder for them to accumulate social capital, the "who-you-know" connections through which information flows and upon which advancement often depends. In consequence, they are more likely to drop out, seeking the greater flexibility and collegiality available to them in other careers.

This attrition is bad news — not only for women, but for the U.S. economy as well. Fifty percent of the current U.S. science and engineering workforce is approaching retirement. America has slipped to fifth, behind China, Japan, Russia and South Korea, in the number of new engineering PhDs it produces. Without dramatically increased participation by women in the domestic science and technology workforce, the U.S. is in danger of losing its historic edge in technological creativity and innovation.

A desire to support such increased technological creativity and innovation is at the heart of the NJIT ADVANCE project. To achieve this goal, ADVANCE jump-starts collaborative matchmaking in a number of different ways. For example, the project sponsors interdisciplinary colloquia that bring leading women science and technology researchers from across the country to the NJIT campus for lectures and small group discussions with faculty. (The 2006-2007 series focused on environmental issues, including global climate change.) These events — the intellectual equivalent of college "mixers" — give female and male faculty from various departments a chance to meet each other and discover shared research interests.

ADVANCE further encourages faculty interconnection by offering an annual seed money grant to the best interdisciplinary research proposal from a woman-led NJIT faculty team. The 2007 award went to assistant professors Camelia Prodan and Edgardo Farinas for their proposal "Noninvasive Bio-Sensors for Drug Discovery, Bio-Defense and Protein Engineering" — a richly interdisciplinary project in which a physicist has teamed with a chemist to do research on the frontiers of biology.

ADVANCE supports cross-sector synergies by linking women researchers in academia with women in New Jersey

industry and state government. This initiative, called the Open Partnership, builds on the strategic concept of "open innovation" used in modern industry, the practice of embracing ideas that come from outside as well as from inside a given organization. The Partnership aims to create new collaborative opportunities for women as a means of creating new opportunities for technological innovation and economic growth in the state as a whole.

In April, NJIT hosted a half-day Open Partnership conference that brought together participants representing nearly 50 different domestic businesses and universities. Strong support emerged from the conference for a project that ADVANCE has championed: a cross-sector virtual research network (V-Net). In order to make this network possible, ADVANCE has already begun to develop a special E-connectivity tool. (The prototype,

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dubbed Syncus™, is being built by IT Capstone student teams, working for the Open Partnership as a client. Senior-year Capstone projects give NJIT students the opportunity to apply their knowledge and skills in meeting the real-world needs of the university and outside groups in education and industry.)

In the near future, ADVANCE hopes to leverage additional resources to develop Syncus™ into a fully functional knowledge-sharing system, including searchable, modular databases containing information on grant applications, patents and publications. A smart search engine will mine the V-Net databases, suggesting potential collaborators to Open Partnership members and facilitating the formation of new research teams around interdisciplinary thematic projects.

We believe that these interconnected efforts — the colloquia and "mixers," the seed funding incentives, the Open Partnership, the V-Net — will help to advance women at NJIT. But the entire NJIT community of scholars will advance as well. Just as biodiversity makes for more resilient ecosystems, human diversity makes for more resilient institutions — institutions that can survive shocks and lean times. In this sense, diversity is not simply "nice." It is smart. It is strong. That strength is a crucial component of the ADVANCE strategy, and a crucial component of NJIT's commitment to excellence. ■

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The Murray Center for Women in Technology on the Web:
<http://womenscenter.njit.edu>