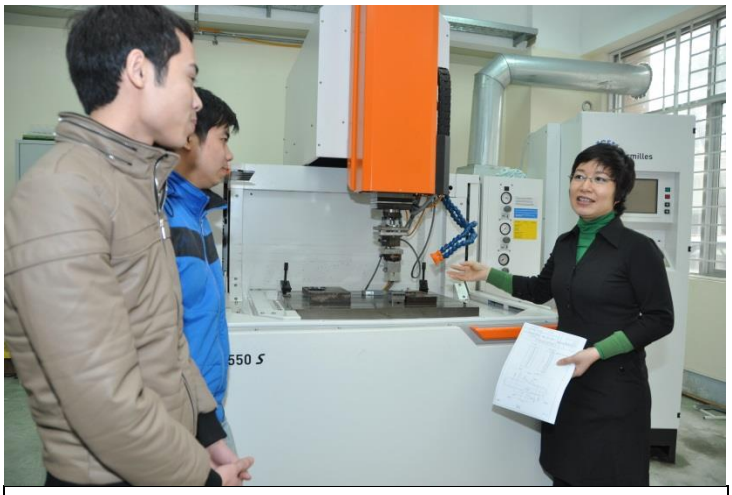
# Mechanical Engineering? Not Too Tough for Dr. Minh



*Dr. Nguyen Thi Hong Minh, Vice Dean of the Hanoi University of Science and Technology's School of Mechanical Engineering, explains how computer aided programming controls cutting of sophisticated equipment used in industry today. Photo: R. Nyberg, USAID*

Dr. Nguyen Thi Hong Minh gives a whole new meaning to cutting edge. To understand why, you only need to look at her title: Vice Dean of the Hanoi University of Science and Technology (HUST), School of Mechanical Engineering - Material Cutting and Industrial Instrument Department.

It's more than a mouthful, but it's also a statement of her resolve in going where few women in Vietnam, at least so far, dare to tread. She and only one other professor represent women in her department's 18-strong faculty. She's hoping that one day this will change.

"Most people would think that engineering is tough, especially mechanical engineering for women," she said. "I have been teaching for many years, and, even now, when I tell them I am in mechanical engineering, people have a strange reaction."

The field of engineering wasn't strange at all for Minh. "To me, it just comes naturally," she said, noting that both of her parents are engineers. "It helped me to overcome the fear of most students that engineering jobs are tough. I see my parents are happy in their jobs. The perception that engineers are strong is not really a correct perception because we do not have to do heavy things with our hands."

Minh wants people to know that her tools are much lighter: computer keyboard, mouse and software that helps instruct students in computer aided design and manufacturing (CAD/CAM). She organized a department open house last year to encourage prospective students to tour the labs and see what is involved in engineering education. "I want to see more balance in gender in our faculty and in our student population," she said. "We need to do more to clear the myth that engineering is tough."

More than a champion and model for women in engineering, Minh is a trendsetter in enhancing instruction by putting students in the center of the classroom. She developed this approach and

other innovative ideas as part of the Higher Engineering Education Alliance Program (HEEAP) started by USAID, Arizona State University (ASU), and Intel Corporation in 2010. Groups of professors from eight colleges and universities in Vietnam travel to ASU each summer for six-week training sessions focused on curriculum reforms to help transform engineering education from passive theory to project-based, hands-on instruction.

The training program's track record on gender balance is much stronger than national percentages of women engineering graduates in Vietnam (estimated at around 8 percent) and even better than women engineering faculty and student representation in the United States (around 20 percent). Of the 97 HEEAP faculty training participants, including the group of professors travelling to ASU this summer, 31 are women. Of these, seven are rectors, vice deans, or deputy department heads.

Phan Thi Thu Thuy, a professor teaching in Ho Chi Minh City University of Technical Education's Department of Mechatronics, said HEEAP provided good ideas to integrate active learning methods and soft skills into her lectures. She now divides her classes into smaller groups of a few students each before giving class assignments. "I encourage them to discuss together. Then I announce that volunteers who come up the board and take the microphone and give the right solution would receive one bonus point which would be counted to the mid-term or final test score. In this way, the students are motivated and highly enthusiastic in their study." Simple changes such as these represent a major shift in an education system built on professor-centered lectures with students memorizing theory.

Minh also sees benefits of the program's approach. "HEEAP gives us more tools and methods to improve our teaching more systematically," said Minh. "The greatest enhancement that HEEAP gave to my process would be the design of the lab activities that would contribute directly to the course requirements."

She works closely with five other professors at her university to redesign curricula using tools like YouTube for posting homework projects and online discussion groups that engage students as mentors and peer educators, facilitating much more discussion before classes and saving Minh time in answering questions already answered by student peers. With full support from other departments and HUST leadership, principles promoted through HEEAP are catching on across the university.

The result? Students maximize online resources, and meet more frequently with their peers to learn. "Many students used to be very shy, but they are gaining confidence in discussions - they can be right or wrong, and they are not afraid of the difference. Students can learn from each other, they can boost their performance, and in the end, they have to believe in themselves that they can do it. To me, that is quite positive."

And quite positively, the change is starting with professors like Minh. It will continue with the women and men who carry the innovative and practical skills out of the classroom and into the working world.