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October 7, 2010

**NATIONAL STUDY IDENTIFIES RANGE OF OPPORTUNITIES TO IMPROVE  
ENGINEERING EDUCATION**

*New Report Reveals Current Strengths, Shortcomings  
of Engineering Students' Academic Pathways*

America's higher education system is widely regarded to be one of the largest and most flexible systems in the world. Despite this advantage, the U.S. is in danger of being outpaced by other countries in producing innovative scientists and engineers. Recent reports by the federal government underscore the challenge faced by the U.S.: science and engineering students need to be better prepared with the motivation, competence, and critical thinking skills required to solve problems and generate technological breakthroughs if the nation is to remain a global economic leader.

*Enabling Engineering Student Success*, a new report released by the Center for the Advancement of Engineering Education (CAEE) and available for download on their website, addresses this challenge by identifying key opportunities for improving how engineering students are currently being prepared for professional practice. A major component of the report, the recently concluded Academic Pathways Study (APS), involved a broad collaboration of scholars who conducted innovative multi-year studies involving over 5,400 students at more than 20 institutions. The APS research also included over 100 newly hired graduates to round out a detailed picture of the paths engineering students take as they enter, experience, and graduate from undergraduate degree programs.

This collection of both qualitative and quantitative data challenges many assumptions about instruction and learning. For instance, despite formal instruction, engineering students risk falling short of the communication or professional skills demanded of

today's engineers. Even as they approach graduation, students may not fully appreciate the need to engage and collaborate with a wide range of individuals in a globally distributed team. Moreover, some students are not learning how to integrate considerations of the broad context of engineering problems into their design processes.

“A significant number of seniors aren't firm on wanting to be engineers and don't always have a complete picture of what engineering work is,” says lead investigator of the APS, Sheri Sheppard, professor at Stanford University. “This is surprising, in part because there's been a national movement to include project-based learning activities, or activities that more closely resemble real-world problems, in regular coursework. There's still work to be done in helping students see the connections between their school activities and engineering practice.” She goes on to emphasize the need for more accessible undergraduate programs, “Thinking like an engineer is an incredibly powerful way of processing and organizing ideas that has applications far beyond engineering; how do we get students to see that studying engineering is a good educational investment?”

In addition to the APS, the report details other CAEE research and programs, including faculty decision-making, teaching preparation for future faculty, and expanding capacity for educational research in engineering. Jennifer Turns, lead investigator of the Studies of Engineering Educator Decisions and professor at the University of Washington, notes that the research on faculty decision-making represents an important and novel approach to studying teaching: “A decision represents the point where educator thinking connects with educator action, and the decision-making process represents a context in which educators can apply research findings about students.” Cindy Atman, director of CAEE and professor at the University of Washington, adds that understanding the engineering student experience is not enough: “We need educators who are capable of using the research. Therefore, in addition to our analyses, we included questions in the report that can be asked by engineering educators to evaluate the effectiveness of their own programs or approaches.” The result is a robust discussion of the current direction of engineering education, where improvements might best be made, and how more students might be attracted to and retained in engineering programs.

The CAEE was launched in 2003 with a grant from the National Science Foundation to a collaboration of five schools: the Colorado School of Mines, Howard University, Stanford University, the University of Minnesota, and the lead institution, the University of Washington. By the end of the grant in 2009, the center had grown to involve over 100 researchers and included scholars at Purdue University, Franklin W. Olin College of Engineering, and Virginia Tech.

The full report, *Enabling Engineering Student Success*, is available for download from the CAEE website: <http://www.engr.washington.edu/caee/>. Additional information may be obtained by contacting Cynthia J. Atman, director of CAEE and professor of human centered design and engineering at the University of Washington ([atman@u.washington.edu](mailto:atman@u.washington.edu), 206-616-2171) or Sheri Sheppard, professor of mechanical engineering at Stanford University ([sheppard@stanford.edu](mailto:sheppard@stanford.edu), 650-723-4287).