A as a graduate researcher in micro-electronics packaging, Maura Borrego necessarily had to sweat the small stuff. Now she grapples with the big questions and hard-to-solve problems in engineering pedagogy, such as how recruits, retain, and diversify, the surge of online learning, and getting instructors to accept change.

“I didn’t think I was a very good materials scientist,” Borrego says of the work that earned her a Ph.D. at Stanford. “And I didn’t feel like I could really make a difference working in that field.” What she relished was mentoring and advising – “helping other people make it through engineering” – and so that became her career. Hired by Virginia Tech in 2005 soon after the school established a department of engineering education, she began creating a Ph.D. program and soon became a leader in the growing field of engineering education research, publishing some four dozen journal articles and book chapters and many more conference papers. She also won both a Presidential Early Career Award for Scientists and Engineers and a National Science Foundation CAREER award, and had a 15-year-long American Association for the Advancement of Science fellowship.

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Now a 20-year Loyola teacher, Keilson teaches multidisciplinary classes intended to expose first-year engineering courses, from mechanical and electrical engineering to basic programming. She strives to show her students how to “look over the cubicle wall” to see what other disciplines focus on.

ASEE has been instrumental in her teaching, says Keilson, a 20-year Loyola teacher. Suzanne Keilson teaches multidisciplinary classes intended to expose first-year engineering courses, from mechanical and electrical engineering to basic programming. She strives to show her students how to “look over the cubicle wall” to see what other disciplines focus on.

As a graduate of an engineering program director “helped me see the entire field of STEM education” and where leadership is needed. On-line learning is one area; she herself completed a Coursera course. Like it or not, “the economics of higher ed in moving in that direction.” She’s also has a growing appreciation for interdisciplinary scholarship, thinking the problems left to be solved are beyond the scope of any single discipline. Now both an associate professor and an associate dean overseeing 14 graduate programs, she still devotes considerable time to helping individual students “figure out what to do with their lives” and chart a “quick path through the university.” Borrego, who ran for chair of Professional Interest Council IV on a platform to really work, has sought to increase communication between ASEE members and Society leaders and headquarters. She also serves as an associate editor of the Journal of Engineering Education. In off-hours, she swims and enjoys watching movies with her husband Gilbert Borrego, a Virginia Tech library information technician.

Maura Borrego Change Agent

Suzanne Keilson Crossing Boundaries

H owever can STEM education innovations avoid the “valley of death” and become widely adopted? I-Corps for Learning, a pilot initiative of the National Defense Science and Engineering education programs, may have to. It is one of over 100 ideas to be brought to the answer. Championed by NSF program director Dan Millard, I-Corps-L seeks to foster an entrepreneurial mini-seed among educators, exciting them to promote and gain broad acceptance of their innovative products and approaches. The pilot study is modeled on the NSF I-Corps program, which helps research scientists and engineers develop the enterprise skills needed to turn laboratory discoveries into commercial ventures.

Last September, ASEE partnered with Karl Smith of the University of Minnesota and Purdue University, Ann McKenney of Arizona State University, and Chion studen students from the University by providing mentors for NSF-funded researchers to assess the potential for sustainable scalability of their educational innovations. The eight-week program is composed of an introductory three-day workshop, five online sessions, and a closing two-day workshop. In January 2014, nine teams embarked on the project. Each team comprised three to four members: an educational researcher, an educational scientist, an engineering educational administrator, and a mentor. Since the program is highly experiential, teams used their current projects as the platform for exploration. The pilot projects covered a wide spectrum in the STEM education arena, examples of which includes a Web platform to speed the propagation of evidence-based instructional approaches, a holistic transition program to support veterans interested in engineering and technology careers, and a boot camp for preparing for the math placement test. Throughout the program, participants engaged in customer discovery to understand the ecosystem associated with their projects, including potential adopters, collaborators, and users. In a challenge similar to one used in I-Corps, each team was instructed to conduct 10-15 interviews related to the nine elements of Osterwalder’s business model canvas; for example, customer segments, value propositions, revenue streams, and key partners. During each session, the entrepreneurial/administrative leads presented their teams’ findings to the entire group, resulting insights gained from the interviews – which in many cases challenged their assumptions and compelled them to shift direction. The instructional team, complemented by Russell Kirta (Colorado State University – Fort Collins), Robert MacNeal, (Working Company), Sham Jordan, and Micah Lando (Arizona State University), provided a guide to help the project teams navigate through the challenge.

Even partway through, it was clear the program was making an impact, with participants using such terms as “transformative” and “intense and challenging” to describe it. “For me, the I-Corps-L Experience was truly empowering,” wrote Marie Millerville, an educational researcher and educational scientists from the University of Pittsburgh’s Department of Rehabilitation Science and Technology. “All who learn to apply these concepts will benefit.”

I-Corps-L is managed by the University of Minnesota’s National Center for Manufacturing Science and Technology (NCMS). The program is an extension of the NSF I-Corps pilot program launched to help researchers gain an understanding of entrepreneurial principles and to push technology projects with potentially commercial potential. Just as with the I-Corps program, the participants must agree to participate in the I-Corps-L program because it is a learning experience and the participants will be assessed for their ability to implement and grow their ideas. The I-Corps-L program is open to scientists and engineers who are interested in commercializing their innovation and are looking for a more structured approach to developing their ideas.

To learn more about the I-Corps-L program, please visit www.asee.org/I-Corps-L. During the 2014 ASEE Annual Conference in Indianapolis from June 10-13, ASEE will be holding a funding workshop to disseminate lessons learned and to reflect on next steps.

Suzanne Keilson is a professor of electrical and computer engineering at Loyola University Maryland. A successful second-year engineering student, she studied neuron action potentials in auditory nerves, combining physics with the biological sciences.

Keilson saw how engineers and physicists approached problems differently while taking electrical engineering courses as a postdoctoral student. “The physicist in me likes to solve problems in closed-form solutions, nice and neat, and that gives a big conceptual framework for the world.” Keilson says. “Engineers need to know what solution is good enough to implement and it will see it move forward.”

Keilson believes assistant professor of engineering at Loyola shortly after a year of postdoctoral work at Johns Hopkins.

Suzanne Keilson was never satisfied with just one discipline. The Loyola University Maryland associate dean and assistant professor says her physics background, complemented by long-time involvement in ASEE, has helped her teach students to think like great engineers – not just in one field, but overall.

Keilson received a bachelor’s in physics from Yale University. Astronomy interested Keilson as an undergraduate, but studying applied physics as a Columbia University graduate student drove her to work in labs where her co-workers studied metallurgy and other materials sciences. As a Ph.D. student, she studied neuron action potentials in auditory nerves, combining physics with the biological sciences.

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