A NOVEL CROSS-CAMPUS COLLABORATION PREPARES ENGINEERING STUDENTS TO TRANSFORM K-12 INSTRUCTION.
Evidence of demand keeps mounting. Some 6,500 schools in all 50 states offer Project Lead the Way’s hands-on STEM curricula, for example, a 36 percent increase in just three years. Engineering is ES-05, key to GE+ is a determination not to dilute the undergraduate engineering curriculum. “It’s not engineering lite, it’s engineering different,” says Sullivan. While supported by education-school pedagogy, its graduate-students are fully fledged engineers with a degree that a top-tier engineering school stands behind. Through a focused curriculum development process, planners say, what might have taken years of engineering and education conversations was condensed into a design-based four-year general engineering sequence that retains the essentials of both, capped by an additional semester of student teaching in an urban high school.

PROJECT-BASED STATICS

The result is a unique degree pathway within CU’s College of Engineering. Engineering in Pre-college Settings: Synthesizing Research, Policy, and Practices

The bulk of K-12 engineering education thus falls to traditionally non-engineering faculty and undergraduates. “It’s not only the way I teach but also what I teach,” says Sullivan, “I want them to get the principles. Tapping a textbook full of equations to plug into canned exercises is a nonstarter,” notes Reamon. Evidence of demand keeps mounting. Some 6,500 schools in all 50 states offer Project Lead the Way’s hands-on STEM curricula, for example, a 36 percent increase in just three years. Engineering is ES-05,
tion supported sp-off established in 2008, has shifted from its origi-

gal goal of preparing engineering teachers for Texas to developing a quality high-school engineering curriculum. “If you ‘learn your trade’ from the top 20% of STEM graduates, then you are currently being taught to 3,000 students in 77 schools in 12 states. Its primary focus is supporting current science and math teachers in the engineering classroom.

FEASIBILITY STUDY

Into the breach come GE+ and CU Teach Engineering. With a grant from Reardon and her team studied the feasibility of de-

veloping a four-year pathway to teaching through engineering without compromising quality. It soon became clear it would take at least six years to emerge with an engineering degree that qualified graduates for a $32,000 starting teacher’s salary — a “nonstarter,” notes Reamon. Campus leaders, including the associate dean of education, convened to hash out a shared vision for a new program. They benchmarked GE+ against UTeach programs, general engineering programs at MIT and other schools, and ABET requirements. “We started to think, wow, may-

be this is possible,” recounts Sullivan. Still, there were “uncomfortable conversations” about whether certain courses had to be included. Data from student course evaluations helped cut out ineffective offerings. Eventually the program won support from department chairs and a unanimous approval from CU’s board of regents, says Sullivan. What emerged was “not only a teacher preparation program with a demanding, design-focused engineering degree but a whole other degree,” says Sullivan, “that might have program that’s a perfect fit.”

Synthesizing Research, Policy, and Practices

Despite rising need, however, undergraduate teacher preparation programs have struggled to put the “E” in STEM education. One ob-

Ox, reports ACT, which administers college admission tests, is the dearth of high school seniors who both have the interest and are capable of managing and teaching engineering education. “It’s not just a textbook full of equations to plug into canned exercises, “I just want them to do the calculations,” he says. “I just want them to do the calculations.”

“IT’S NOT ENGINEERING LITE, IT’S ENGINEERING DIFFERENT.” — JACQUELYN SULLIVAN, CO-DIRECTOR OF GE+ AND CU TEACH ENGINEERING

The GE+ and CU Teach Engineering pathway distills two sets of degree requirements into a single four-year sequence, followed by an additional semester of paid student teaching with a master mentor-teacher. The goal is to hash out a shared vision for a new program. They benchmarked GE+ against UTeach programs, general engineering programs at MIT and other schools, and ABET requirements. “We started to think, wow, may-be this is possible,” recounts Sullivan. Still, there were “uncomfortable conversations” about whether certain courses had to be included. Data from student course evaluations helped cut out ineffective offerings. Eventually the program won support from department chairs and a unanimous approval from CU’s board of regents, says Sullivan. What emerged was “not only a teacher preparation program with a demanding, design-focused engineering degree but a whole other degree,” says Sullivan, “that might have program that’s a perfect fit.”

Synthesizing Research, Policy, and Practices

Despite rising need, however, undergraduate teacher preparation programs have struggled to put the “E” in STEM education. One ob-

Ox, reports ACT, which administers college admission tests, is the dearth of high school seniors who both have the interest and are capable of managing and teaching engineering education. “It’s not just a textbook full of equations to plug into canned exercises, “I just want them to do the calculations,” he says. “I just want them to do the calculations.”

“IT’S NOT ENGINEERING LITE, IT’S ENGINEERING DIFFERENT.” — JACQUELYN SULLIVAN, CO-DIRECTOR OF GE+ AND CU TEACH ENGINEERING

The GE+ and CU Teach Engineering pathway distills two sets of degree requirements into a single four-year sequence, followed by an additional semester of paid student teaching with a master mentor-teacher.