WeTeach_CS: Strengthening the Pipeline of Certified Computer Science Teachers
written by Gail Thomas for 100Kin10 Partner Progress Stories

One balmy fall afternoon in 2014, while looking for computer science (CS) courses for her high school son, Carol Fletcher made a surprising discovery: Austin schools offered few opportunities for kids to learn basic computer science skills. As Deputy Director of Texas Regional Collaborative for Excellence in Science and Math (TRC), Carol didn't work in computer science, but she certainly understood its importance to America's future. As she looked more deeply, the news was shockingly dismal:

"Only 2 percent of high school graduates in Texas have taken a computer science course, and school districts don't help teachers learn CS or get certified. Less than 15 percent of high schools even offered computer science. If you look at the data across the nation, there were, like, 10 states that didn't have a single person of color take an AP computer science test."

Fortunately, Carol has many years of experience working in teacher professional development (PD) for science and math teachers; and TRC is a project of the University of Texas's Center for STEM Education (Center for STEM Ed). She sprung into action, "It was a big problem, but I knew it was also very solvable." And there was no time to waste.

"With more than 16,000 current job openings in Texas related to computer science, high school students needed some exposure to these high-demand, high-wage careers before college."

Initial Challenges: Technology, Curriculum and Certification

From the start, it was a daunting mission. "Very few teachers or administrators in K-12 education have a strong technical background in computer science" said Carol. "As a former science teacher and current school board member, I count myself among them. But I do know teachers and how to affect change in school districts."

Her team started with TRC's successful PD model for math and science teachers and began to seek out CS experts who could adapt that model to computer science. "We had to find a really talented retired computer science teacher to design content, as we didn't want to steal somebody from the classroom." Through the Center for STEM Ed's wide network, they found John Owen, a nationally recognized computer science teacher with over 20 years experience. Together, they began talking about how to get more teachers certified to teach CS.

With Carol and John spearheading the effort, the Center for STEM Ed now had a new project: developing a face-to-face PD course that would prepare teachers to pass the difficult CS certification tests. By now it was summer 2015, and the Center for STEM Ed was accepted to participate in 100Kin10's 2015 Fellowship program, which would help them figure out how to develop, design and implement their certification courses.

New Hurdles: Distance, Online Design and Funding

At the 100Kin10 Fellowship, the Center for STEM Ed's team included Carol, John, and Amy Werst, Manager of Programmatic Operations. One key element of the Fellowship experience is user testing, which requires that partners try their concepts out in the field. Accordingly, Carol's team designed a prototype, a pilot program to test their content for the certification course.

Introducing the prototype in Austin, the Center for STEM Ed tested face-to-face PD courses for CS teachers. Originally designed to be one day, then two days, Carol's team quickly discovered that the large volume of material required more instruction time to be effective. Plus, there was no economy of scale for the face-to-face PD courses to reach teachers in all corners of the state. Texas is just too big. There was demand, but too few instructors. Teachers in remote areas simply couldn't travel 1,000 miles each way for training.

Strategically, the next step was obvious, Carol's team had to "take this certification prep course and turn it into an online course." However, designing and executing a successful online course was a challenge magnitudes bigger than what the team had conquered thus far.

"We had no idea how to create an online course. Once again, we had a vision but we needed partners with the right kind of experience to help us realize that vision."

The ambitious project needed funding to hire people with the right skills to execute online instructional design. Thankfully, Carol's team won a $295,000 Fellowship grant from 100Kin10, with funds provided by the Elsa and Peter Soderberg Charitable Foundation and Simons Foundation, to turn their ideas into reality, a reality brimming with the potential to become a model for other states trying to overcome the same challenge.

"Because we had a strong vision, because we had great experience in math and science, they [100Kin10] were willing to roll the dice on us. We did something that was very much out of our comfort zone, both in content and delivery; but we do know how to reach and serve teachers in school districts across the state and we have this huge network to get the right people onboard."

The funding from 100Kin10, followed by a $1.3 million grant from the Texas Education Agency (TEA) and $50,000 from AT&T, enabled Carol's team to hire Wes Monroe, a project manager with strong engineering and software project management skills, along with a technical support team to get the course on its feet. The new staff understood online teaching pedagogy and made informed decisions related to the course platform, length and other technical subject areas where Carol's team lacked experience. And thanks to expertise from a branding design team, their project now had a name: WeTeach_CS.

Implementation: Challenges on the Ground

Like the test, the certification course would be very difficult and WeTeach_CS required that teachers have some CS experience before signing up. Careful not "to set anyone up for failure," Carol's team informed school district leaders that training "would not be a magic bullet." Data showed that people don't usually complete online courses. Massive, Open, Online Courses (MOOCs) have a 3 percent completion rate.

"We were really worried. How do we get people to sign up and stay connected? We've provided them a structure and materials to study and prepare, but it's a lot of work to do it." The 100kin10 grant money, along with funds from the TEA, allowed WeTeach_CS to provide $1,000 stipends to teachers who pass the test and get certified. That got their attention. Teachers signed up and the first WeTeach_CS certification course had a 25 percent completion rate. In the process, Carol's team learned that teachers' motivation went much deeper than a stipend, teachers really wanted to expand their skills to help students.

Success, and Keeping it Going: New Challenges Ahead

In 2015-16, WeTeach_CS trained 1,352 Texas educators through various CS professional development experiences and helped 177 teachers receive their CS certification. The year before, in the entire State of Texas, every pre-service teacher preparation program in the state produced 14 computer science teachers.

WeTeach_CS continues to expand its online certification course, as they apply lessons from the inaugural certification course to their second course offering. Carol's team has established an advisory board of both experienced computer science teachers and recently certified ones to develop best practices for the next online certification course.

A supportive community of CS educators is growing in Texas and beyond. In 2016, WeTeach_CS held its first Summit which brought together almost 300 teachers, administrators, and practitioners to network, learn, and share experiences about growing computer science education opportunities in Texas. In 2017, WeTeach_CS will begin offering its CS certification course worldwide, through EdX, an online learning destination and MOOC provider which "offers high-quality courses from the world's best universities and institutions to learners everywhere."

As for current challenges, Carol points to "finding ongoing funding, without the constriction of going one grant at a time." The momentum is there. WeTeach_CS is bombarded with calls from companies, teachers and schools that want to participate in the program. In addition to 100Kin10, AT&T and TEA, WeTeach_CS has received funding from entities including Google, Oracle, Microsoft, IBM and NSF's Expanding Computing Education Pathways Alliance.

With just one year under their belt, WeTeach_CS has laid the foundation to help hundreds of Texas schools and districts increase access to computer science for all

students. But there's still plenty of work to do. "With 1,200 school districts and over 1,500 high schools in our state, we've got our work cut out for us," says Carol. "We are, quite frankly, on a mission to change the face of K-12 computer science education in Texas and we won't stop until every student, regardless of their background or geography, has an opportunity to develop the technical skills that are key to high wage/ high demand jobs of today and tomorrow. That's a big challenge, but one that Texans can't afford not to meet."