



Western Wyoming Community College unites rural communities with CS

About the organization

- <https://www.westernwyoming.edu>
- Offers one-year certificates, two-year associate degrees, and some four-year degrees to 2,600 students

What they wanted to do

- Improve teacher knowledge of computer science
- Encourage teachers to add computer science into other disciplines
- Prepare teachers for certification for new Advanced Placement Computer Science Principles exam

What they did

- In partnership with the University of Colorado Boulder and its [Scalable Game Design project](#), developed workshop on incorporating game design into lesson plans

What they accomplished

- 120 teachers attended workshops in August 2016 and January 2017
- Inspired teachers to add computer science and gaming to more classes
- Helped students with learning challenges benefit from hands-on problem-solving classwork
- Tapped into valuable expertise at the University of Colorado Boulder, in order to share this knowledge with rural schools

Challenge

Wyoming is the country's least populated state, and many schools are in rural areas with somewhat scarce resources for teachers. Carla Hester Croff, Associate Professor of Information Technology at Western, knows well the challenges of bringing computer science (CS) education to students in the state. "There is one full-time computer science faculty at Western, and that person is me," says Hester Croff.

The Wyoming schools' lack in computational subjects was affecting students' ability to prepare for and compete in the work world. By improving CS education, schools can help sharpen students' technical and critical thinking skills and set them up for success in any career, including in the CS field.

Teachers in Wyoming schools often teach multiple subjects and many classes, limiting their ability to engage in training that isn't directly related to their specific subject area. "I'm the only science teacher," says Sharon Seaton, who teaches 10 different science classes at Black Butte High School. While Seaton had some background in CS from her years as a teacher in Iowa, she was unsure how to incorporate CS into classes that weren't related to technology.

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— Carla Hester Croff, Associate Professor of Information Technology, Western Wyoming Community College

Solution

"I spent 18 years in the technology industry as a systems trainer and technology manager before teaching in academia," says Hester Croff. "I'm a strong believer in training the trainers, or in this case the teachers."

She could see that Wyoming teachers like Seaton needed practical, easy-to-learn techniques for adding more CS content to their classrooms. Hester Croff established a relationship with Yasko Endo and the [Scalable Game Design project](#) team at University of Colorado Boulder. Hester Croff also applied for funding from Google's [CS4HS program](#) to offer [teacher workshops](#) that train Wyoming teachers from other STEM disciplines, who are new to CS, on incorporating CS fundamentals into lesson plans through game design.

In the communities served by Hester Croff, teachers don't yet have the credentials to teach Advanced Placement (AP) computer science. Hester Croff saw the workshops as one way to begin training teachers. The workshops, which attracted about 120 teachers, included tutorials on teaching CS fundamentals to students by programming games, and gamifying CS to help students better understand concepts included in the new [AP Computer Science Principles course](#).

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Benefits

Greater reach for CS learning

Following the initial game design workshop, teachers like Seaton are adding computer programming to their lessons and following Hester Croff's detailed [lesson plans](#). Using CS skills, students can brainstorm different approaches to solving a problem, and student excitement about hands-on game development is infectious, Seaton says. In a biology class about invertebrates, Seaton used a game created by University of Colorado Boulder CS instructors based on the classic arcade game [Frogger](#), and created a [lesson plan](#) around the game. "When one student first programmed the game so that frog crossed the water, he screamed, 'I did it!'" Seaton recalls.

Improved teacher confidence

"Our workshops have shown teachers that they don't need to be afraid of computer science," Hester Croff says. Seaton agrees: "Most of our kids are [digital natives](#), and you need to be able to relate to kids on their level. We can use computer science knowledge to connect with students."

To build teacher expertise on the new AP Computer Science Principles exam, Hester Croff uses her workshops to explain how to connect hands-on lessons to concepts students need to pass the exam. Hester Croff also visits the classes to co-teach and provide one-on-one advice, ensuring teachers have the support they need to teach CS confidently.

At Black Butte High School, Seaton sees clear signs that her professional development experience has benefited her classes. "The training has made me more comfortable teaching computer science," Seaton says.



Wyoming high school students and teachers participating in the computer science trainings provided by Carla Hester Croff (center front, left).

She can offer more hands-on exercises to students, which helps children who've had difficulties with traditional lecture-based lessons.

"With game design, I don't even have to explain to them how to find the answers," Seaton says of her students' adaptability. Teaching CS through game design projects has given her students a hunger to learn, and to problem-solve with technology.

Google CS4HS

CS4HS funding enables computer science education experts to provide exemplary CS professional development for teachers. The funding focuses on three major growth areas for teacher professional development in computer science:

1. Facilitating the development and delivery of content that increases teachers' knowledge of computer science and computational thinking
2. Allowing educators to customize learning content to meet local needs and share best practices for engaging all students
3. Building of communities of practice that continue to support teacher learning throughout the school year

For more information on CS Professional Development, visit www.cs4hs.com and join our [G+ Community](#).

Inspiration for further teacher training and programs to build on student enthusiasm

Along with the CS teacher workshops, Hester Croff used the CS4HS funding to implement "Do You Want To Think Like a Computer Scientist?" events. These events are conducted after school at various schools throughout Wyoming, where parents and children are invited to attend.

The events feature [STEM training](#) and CS stations, which include using Google Cardboard for virtual reality, binary coding without a computer, using hands-on Makey Makeys, and computer programming. "I had amazing feedback from parents the following day," says Susan Dickman, Principal of Pilot Butte Elementary. "Many feel that their students have inadequate exposure to CS as they enter high schools, much less college. As both parents and educators, we want to prepare students to be college-ready and career-ready; yet we are overlooking a key component of their educational future."

Seaton has also become inspired to feed her students' excitement for hand-on projects involving CS, setting up the first robotics club for her school. "The experience with computer science has opened kids' eyes," Seaton says. "It's shown them that becoming a computer scientist or an engineer isn't out of their reach. It's been wonderful to watch them blossom."

