

UW CSE Outreach Program 2011-12 Annual Report

The University of Washington Computer Science & Engineering outreach program introduces students, teachers and counselors to the exciting world of computing. This year we began an intensive effort to expand our activities, with the ultimate goal of significantly improving K-12 computer science education in our region, and the appeal and gender balance of our program.

Our K-12 outreach efforts are focused on supporting teachers' professional development and exposing students from traditionally underrepresented groups to computer science and to UW CSE. Our work with teachers is guided by the notion that lack of classroom-ready resources is a significant barrier to teaching meaningful computer science in K-12. When working with K-12 students, we aim to provide a real-world taste of what computer science entails while emphasizing the field's potential to address some of the world's most pressing problems. We use a similar message when targeting high-achieving female students already in our introductory courses at the University of Washington.



One of our early initiatives this year was to consolidate our K-12 outreach programs and brand them in a catchy, memorable way. A department-wide contest led to the name “DawgBytes” with the tagline “a taste of CSE.” Our logo, seen at left, was conceived by a recent alum. We have created t-shirts and other branded gear to increase our visibility, particularly among underrepresented K-12 students. Informal observation suggests that students show off their DawgBytes gear and use it to tell their friends about our programs.

In the 2011-12 year, over 120 teachers and 1,000 K-12 students were reached through our outreach efforts. Over 30 UW CSE students were involved. Our new initiatives included 2 summer professional development opportunities for teachers, 3 weeks of computer science summer camps for middle school and high school girls, and hosting the NCWIT Award for Aspirations in Computing. We also significantly increased our presence in K-12 schools through UW student presentations and mentoring.

For the 2012-13 academic year, we intend to continue refining existing programs while adding several new initiatives including follow-up activities for camp participants, a computer science community night, online tools to assist teachers, and an equipment lending library for local classrooms.

Descriptions of our 2011-12 initiatives follow. More information is available on the DawgBytes website: <http://www.cs.washington.edu/dawgbytes/>.

Honors Sections in our Introductory Courses

This year we added an honors section associated with CSE 142, our introductory programming course, modeled after the existing CSE 143 honors section. This seminar-style course is designed for up to 25 students from the UW Honors College to read and discuss a book with significant computer science content with a faculty member. In these sections, we make a particular effort to highlight the societal impact of computing as well as the deep intellectual roots of CSE. The goal is to attract UW's highest achieving students, particularly women, to CSE.

High-Achieving Women's Tea

We invited the top 30 women in CSE 142, our introductory programming course, to have tea and a discussion about CSE with a faculty member and some current undergraduate women in the department. After a brief presentation, we encouraged students to share their questions about CSE. We did this halfway through the quarter and found that several of the students were more comfortable talking to their instructor and asking for advice during the remainder of the quarter.

Classroom Visits (various dates winter and spring quarters)

<http://www.cs.washington.edu/education/courses/cse490o/12sp/>

UW CSE undergraduate and graduate students as well as faculty members visited over 25 local middle and high school classrooms to discuss computer science. We developed and refined a standard presentation including content about UW CSE's undergraduate program, internship experiences, social impact of computing and futuristic CS research.

Through the K-12 Computing Education seminar offered in spring, graduate and undergraduate students logged over 160 hours of volunteering as mentors in middle and high school computer science classrooms.

Support of teachers and direct contact with students are keys to pipelining students into the field.

Puget Sound CSTA Meetings (various dates)

<http://www.pscsta.org/>

We host and participate in monthly meetings of the Puget Sound Computer Science Teachers Association (PSCSTA) chapter. (CSTA is a national organization for K-12 teachers of computer science.) These meetings are an opportunity for local computer science teachers to learn new teaching strategies and discuss their classroom practices. In the context of PSCSTA, we have moderated discussions and led mini-workshops on new CS education topics.

Programming Competition (Saturday, December 10th, 2011)

<http://www.pscsta.org/2011/12/december-programming-contest-results.html>

Programming competitions allow like-minded students from various schools to share their excitement for computing while deepening their programming expertise. Students participate in teams of 1 to 3 students and solve small to medium scale programming problems in a language of their choice over the course of 3 hours.

We have used this gathering as an opportunity to expose students to exciting research going on at the University of Washington. This year's competition brought together 140 students from 15 different schools who heard about security research carried out by faculty member Yoshi Kohno's group.

Interestingly, the gender balance of these competitions is quite good – far better than in ACM's collegiate programming competition.

NCWIT Award for Aspirations in Computing (Saturday, March 17th)

<http://homes.cs.washington.edu/~ln/outreach/2012ncwit/>

The NCWIT Award for Aspirations in Computing “honors young women at the high-school level for their computing-related achievements and interests.” We hosted the award ceremony for 20 Washington state winners and 1 education award winner. We used this opportunity to expose winners to novel computer science research and get them to work together on problem-solving activities.

Inspirational Teacher Dinner (Thursday, May 10th, 2012)

<http://news.cs.washington.edu/2012/05/10/uw-cse-inspirational-teacher-dinner>

When UW students enter our program, we ask them to nominate a K-12 teacher who inspired them. We then invite the nominated teachers, their partners, and their nominating students to a dinner where they reacquaint and learn a bit about computer science. Providing recognition to teachers who send us strong students pays dividends in recruitment.

Because young women are more likely to nominate teachers, this event gives us a great opportunity to reach teachers who inspire strong female students. Year after year we hear from new students that teachers we previously recognized encouraged them to aspire to our program. This year, we recognized 49 teachers.

Programming Symposium (Monday, June 4th, 2012)

<http://seattlesciencefestival.org/icalrepeat.detail/2012/06/04/949/computer-programming-symposium>

The programming symposium, part of the Seattle Science Festival, introduced about 400 students ages 12 - 18 from to the world of computer programming. This diverse audience had

no prior significant computer science experience and representing 13 different schools. UW CSE played a key role in designing and delivering the symposium's content.

Summer Camps (Week-long sessions July 16th - August 17th, 2012)

<http://camps.cs.washington.edu/>

For the first time this summer, we held day camps for middle and high school students. Over the course of our 3 week-long sessions, we served 63 students, 24% of whom are on free and reduced lunch. During camp, participants heard from members of the UW CSE community, discussed big ideas in computer science, and completed projects in Processing, a Java-based programming environment for artists and designers. The first project was to design a face made of basic geometric shapes and then animate it based on ambient noise. For example, many students made their faces' mouths grow as the volume increased so that the faces looked like they were singing along to songs or talking back to them as they talked. Other projects included a paint program with creative custom brushes and image manipulation filters – programs put on Android phones.

When asked whether camp made our high school participants more interested in computer science, 86% strongly agreed and the remaining 14% agreed. 76% strongly agreed that they would recommend camp to their friends, 19% agreed and 5% were neutral. Perhaps of greatest interest to us, 62% strongly agreed that they would take a computer science class in college and the remaining 38% agreed.

There's a video overview of one of the middle school camps here:

<http://news.cs.washington.edu/2012/09/29/uw-cse-summer-daycamps-for-secondary-school-students/>

AP CS Workshop (July 30th-31st, 2012)

<http://www.cs.washington.edu/homes/reges/csta/apcs/>

In this two-day workshop, 6 teachers from around the Puget Sound gathered to learn about the structure and pacing of an Advanced Placement: Computer Science A offering based on our introductory programming course, CSE 142. We discussed course philosophy, grading strategies, specific assignments and more. Teachers left the workshop with copies of Building Java Programs and free, complete materials to use in their classrooms. We will also be providing follow-up throughout the year.

CS4HS (August 6th-8th, 2012)

<http://cs4hs.cs.washington.edu/>

UW CSE partnered with Carnegie Mellon and UCLA six years ago to create Google's CS4HS, an initiative designed to promote computer science and computational thinking in K-12. This summer, 120 universities - half from the US and half International - participated. UW CSE's three-day CS4HS workshop targets math and science teachers because they can help expose a representative cross-section of the student population to computing. This summer, 78 teachers from local middle and high schools participated in the workshop. Of these, 31 teach

math, 19 teach science and 28 teach other subjects. For the first time this summer, we also invited school counselors to participate.

During our three days with teachers, graduate students presented cutting-edge CSE research, professors shared their vision for why CSE is an exciting field to be in, and we provided a variety of ready-to-use activities appropriate for a broad range of classrooms.

Bootstrap Workshop (Friday, August 10th, 2012)

<http://www.bootstrapworld.org/workshops/>

Bootstrap is a free curriculum to support algebraic learning in the context of video game programming. Emmanuel Schanzer, the curriculum's creator, came to UW CSE to prepare 39 local middle and high school teachers to teach it in both after-school and classroom contexts. This workshop helped us provide accessible resources to teachers who had not yet been able to incorporate CS content into their classes.

Summer Academy for Advancing Deaf & Hard of Hearing in Computing

<http://www.washington.edu/accesscomputing/dhh/academy/>

Richard Ladner's outstanding Summer Academy for Advancing Deaf & Hard of Hearing in Computing is an academically challenging 9-week residential program designed for deaf and hard of hearing students with skills in math and/or science who may be considering computing as a career.



Above: Summer camp participants learn about discrete math from card tricks and create mobile phone apps in Processing.
Below: A teacher workshop. Paul Osborne, 2012 NCWIT teaching award winner. Inspirational teacher award dinner.



Above: High school visit to the ubiquitous computing lab. STEM Out! Middle school summer camp.
Below: Programming competition participants learn about security research and work on challenging problems in teams.

