CODE-4-KIDS

A student team who took BEST Co-PI Chris Schaffer's Science Policy Bootcamp course (BME4440) led a major K-12 education initiative emanating from ideas generated in the course. Two STEM graduate students (one in electrical engineering, one in neurobiology & behavior) became interested in improving K-12 computer science instruction. They recognized algorithmic thinking as a new kind of basic literacy that most 21st century workers needed. They also saw that the current shortage in the US of qualified computer science graduates stems, in part, from the need to begin computer science instruction as a first year college student (due to the hierarchical nature of the subject). To confidently begin computer science during the first year of college, students must not only know about the subject but have also developed an affinity for it during their earlier schooling. However only about 10% of high schools offer computer science instruction, and earlier instruction is almost non-existent. Because the local high school already offered computer science, this pair of graduate students decided to focus on developing and implementing instruction in algorithmic thinking and computer science in grade school.

Ph.D. student Nikolai Rakhilin and now Cornell graduate Arjan Nirh identified some existing resources on content and pedagogical approach (code.org was a primary resource) and outlined how these resources, together with some newly proposed modules, could be used to create a three different semester-long curriculums (meeting bi-weekly) that teach computer science at three different levels: grades1-2, 3-4, and 5-6. They pitched this high-level plan to the Principal of a local elementary school and the local school board, and received enthusiastic approval to pilot the project, including taking time during the school day. They recruited dozens of graduate and undergraduate students from a variety of STEM fields, focusing on computer science, as volunteers.

Through visits to the school to meet with teachers, they similarly inspired a number of teachers to play an active role in the project. The graduate students then led this group of other STEM students and teachers to flesh out the three different curriculums that had been outlined to the point that they were ready to implement. They further partnered with the school Principal to write a grant to purchase some computers and to pay for teacher time, which was funded. During the Spring 2015 semester, this curriculum was rolled out to ~40 1st and 2nd graders, ~30 3rd and 4th graders, and ~40 5th and 6th graders, involving about two dozen student volunteers and five teachers, and over bi-weekly meetings for the full semester. The program enjoyed remarkable success, as determined by brief assessments of awareness of and attitude toward computer science as well as algorithmic thinking capabilities. Students, teachers, parents, and volunteers have also all praised the program, with no dissenting concerns raised so far. To ensure continuity for the program, the PhD students have moved to institutionalize the effort into a student club at Cornell to facilitate volunteer recruitment. They have applied for additional funding from both a local foundation and NY State.

To raise awareness, they have submitted an op-ed to the local paper describing the need for and success of their program. One of these students is moving on to a post-doc in North Carolina and has already planted the seeds to expand the program there. The other student will continue to lead the effort in Ithaca, NY. In addition to the already realized and enormous potential impact of this program for the elementary school students, creating and running this program provided a fantastic leadership experience for the graduate students. We emphasize that while these students sought advice and mentorship from a diverse group of stakeholders, they ultimately made all the key decisions to move this project forward.

Read the *Ithaca Journal* story at:

http://www.ithacajournal.com/story/news/local/2015/06/02/kids-learn-code/28376049/