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Models for computer science K-12 outreach activities

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MODELS FOR COMPUTER SCIENCE K-12 OUTREACH ACTIVITIES*

PANEL PRESENTATION

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INTRODUCTION

It is widely known that our computer science students do not reflect the diversity of the population at large [1]. One method for encouraging broader participation in computer science is to design and deploy outreach activities targeted for K-12 students [2,3,4]. Goals for outreach activities are numerous: to provide a more accurate view of the computer science discipline, to increase students' confidence in their CS abilities, to provide opportunities for students to meet working professionals, and to counter negative stereotypes about the computing culture. Outreach activities can vary widely in terms of target audience, duration, and overall objective; therefore, it might seem daunting to design and deploy outreach activities. The goal for this panel is to provide models of outreach activities for audience members to import for use in their own communities and institutions.

Panel participants will share their experiences when designing and deploying outreach activities. In particular, each panelist will address the objective of the activity, the target audience, a short description of the activity itself, and key aspects for successful deployment. We intend that the panel session and associated written materials will provide resources for others to draw upon as they lead their own outreach activities. The activities are listed below from shortest to longest in terms of hours spent with attendees.

EXPANDING YOUR HORIZONS WORKSHOP FOR GIRLS

Laurie Murphy

Expanding Your Horizons conferences bring together middle and junior high girls to encourage them to study math and science and consider math-based careers. The state of Washington sponsors 10 to 15 of these daylong conferences each year. The main objectives of the conference include introducing girls to female role models in math-related careers and encouraging them to take math and science courses in high school. The girls attend a keynote address and three one hour workshop sessions of their choice. Each workshop has two main components: introduction by the facilitator explaining how she chose her career followed by a hands-on activity. For this workshop, the hands-on activity is an introduction to programming using Alice. Preparation included attending pre-conference meetings and coordinating with conference organizers. The University of Washington, Tacoma provided the equipment, software installation, and supplies. A key aspect of success is working with an established program such as Expanding Your Horizons. [see http://eyh.pugetsoundcenter.org/]

WORKSHOPS TO INTRODUCE COMPUTER SCIENCE TO INNER-CITY HIGH SCHOOL STUDENTS

Brad Richards

This five-hour workshop is designed for bright but disadvantaged juniors and seniors at an inner-city high school, introducing them to the field of computer science. The students participate in a series of activities to introduce them to the notion of an algorithm and the precise way we write instructions for a computer. Students then propose and experimentally compare approaches for sorting in a computer lab. In one workshop, we focus on routing algorithms and use the lab to experiment with them. In a second workshop, we focus on artificial intelligence and have students work on heuristics for a connect-four game. The day concludes with a summary of the activities and a broad overview of the field. The cost of materials is essentially zero, since we use hardware/software in the computing lab. The preparation time is a few hours for each workshop. Key aspects for a successful deployment include strong support from the organizers at the high school level and college-level assistants for the laboratory activities.

SUMMER CAMP FOR HIGH SCHOOL STUDENTS WITH DISABILITIES

Tammy VanDeGrift

The Disabilities, Opportunities, Internetworking, and Technology (DO-IT) program at the University of Washington invites high school students with disabilities to a week-long on-campus camp. The goal of the camp is to encourage students with disabilities to learn more about certain disciplines and to increase their confidence when working with technology. Students attend a week-long workshop module for three hours per day. The computer science module, designed and led by Richard Ladner, introduces students to computer programming and algorithm design in the context of the game of life. No special equipment other than access to computers was necessary for this workshop. Preparation for facilitators (undergraduate and graduate students in CS) includes spending a few hours to

understand the existing code for the game of life. Key aspects for the workshop's success include having a one-to-one ratio of facilitators to students and working with an established university program for disabled students.

8-WEEK ROBOTICS AND CS COURSES FOR HOME SCHOOLED STUDENTS

Brent Wilson

These 8-week courses are designed to give middle/high school-aged home school students an opportunity to have fun, experiment with hands-on activities, and be exposed to new topics, such as robotics and introductory CS. The courses are student-led by seniors in the undergraduate program. In the robotics course, we use Lego robots and software resources from Carnegie Mellon University to introduce students to the field. The introduction to CS course uses JavaScript so students can create published web projects for family and friends to view. Necessary resources include the Lego robot kits and a computer lab for the robotics course and a computer lab for the introduction to CS course. A key aspect for the success of these courses is to keep them fun and hopefully students will become more excited about a future in computer science or engineering.

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