

Improving Computer Science Diversity through Summer Camps

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ABSTRACT

Summer camps offer a ripe opportunity for increasing computer science diversity. This panel provides several examples of summer camps that specifically recruit from traditionally underrepresented demographics. The panelists run camps at a community college, a private liberal-arts college, and public universities. The camps are residential and day camps, coed and all-female camps, ranging from three-days to two-weeks long, with campers from 10-years-olds to high school seniors. In addition to describing their camps, the panelists will provide information on securing funding, recruiting campers from underrepresented populations, measuring impact, and lessons learned along the way. Demonstrations of what campers accomplished will also be shown.

Categories and Subject Descriptors

K.3.2 [Computing Milieux]: Computers and Education-Computer and Information Science Education[Computer science education]

General Terms

Human Factors

Keywords

Summer Camps, Gender, Diversity

Dennis P. Groth

The School of Informatics was founded at Indiana University in 2000, with an undergraduate BS degree in Informatics. The school was the first of its type in the country, and provides information technology education in the context of student-selected specialty areas of study. Because the resulting degree provides a significantly broader set of skills, and accommodates a wider set of student interests than a traditional computing degree, the school experienced both rapid enrollment growth and increased diversity in its student population. Even with improvements in the diversity

of the Informatics student population, the school made an early decision to commit to enhancing diversity, with summer outreach programs as a key first step. The summer outreach programs include integrating Informatics programs into existing pre-collegiate summer programs, as well as the creation of a residential summer camp for high school students.

The Informatics Summer Camp, like the Informatics degree, exposes students to the breadth of areas that Informatics can be applied. In order to support a more diverse future IT-based profession we recruit from areas within the State of Indiana with traditionally underrepresented students, as well as provide financial support for students with need. Through these efforts we have maintained diversity of the camp at greater than 50% for students that are traditionally underrepresented in IT. We have expanded the number of students attending the camp each year following our initial camp in the summer of 2004. In this panel I will present the history and structure of the School of Informatics' summer outreach programs, the goals and objectives for these programs, and the outcomes we have experienced.

Helen H. Hu

Studies have shown that girls begin to lose interest in math, science, and computers in middle school and choose to opt out of advanced high school math and science classes [2]. This decision limits their options in college. If the girls later develop an interest in computer science in college, they find themselves playing catch-up on the prerequisite math classes.

Westminster College runs a three day residential camp for girls identified by their teachers as not performing at their true ability level in school. This summer camp, called AWE+SUM (*Attend Westminster, Explore Science, Use Math*), is designed for girls entering eighth grade that fall. During the three days, female Westminster professors teach six different science, math, and programming workshops. The following January, prior to when they schedule their high school freshman classes, we invite the girls back to campus for a reunion.

The "Programming with Alice" workshop uses storytelling in 3D virtual worlds to teach computer programming. While having fun creating narratives involving ice skaters and pen-

guins, the students are gaining valuable experience with complex programming concepts such as control structures, methods, and object-oriented design. Our campers do not express an interest in computer science before arriving at the camp, but they are all exposed to programming through the Alice workshop. In our anonymous post-camp surveys, a high percentage of the girls consistently indicate that the Alice workshop was their favorite session.

To engage girls from all socioeconomic levels, we make the camp as inexpensive as possible and actively recruit traditionally underrepresented minorities. We charge only a nominal fee for each girl to reserve her place at the camp and waive that fee for anyone who shows financial need.

Betty Lauer

Quinsigamond Community College (QCC) provides various K-12 outreach programs to an urban population. These programs include Women in Technology, Youth in Technology, Robotics, Summer Technology Academy with a variety of STEM topics, all supported through a variety of grants. Each of these programs have some common components:

- Use project-based learning model on technology topics and integrate the application of the underlying science, engineering, and math;
- Integrate skills defined by the Partnership for 21st Century Learning to encourage a well-rounded curriculum;
- Have high performance expectations and high attendance expectations;
- Focus on participants (as a majority) who are in the middle 50% of the academic scale, are minorities that are underrepresented in STEM fields, and live in families that earn under \$27,000; and
- Include activities for college preparatory and planning.

For two weeks in July 2007, QCC offered the Technology Academy for Girls (ages 10 to 14 years) for 25 young women from the Worcester Public Schools in Massachusetts. The subject track was Computer Science Careers. Participants explored various computer-related careers while using a hands-on project approach. Each participant:

- built their own computer from OEM parts
- installed and configured Windows XP and Linux operating systems
- installed and learned to use Open Office by creating letters, reports, and spreadsheets
- edited and produced their own video
- electronically designed and created their personal logo
- developed basic computer programs
- developed computer manuals on how to perform routine maintenance or accomplish routine tasks
- connected computers to a workgroup network for sharing resources

- designed and implemented personal web pages with multimedia utilizing html

Participants visited Intel Corporation to see computer-related careers in action. The camp concluded with an Open House in which parents and family, sponsors, members of the local business and academic community had lunch with the girls and celebrated their accomplishments that included prizes for excellence in performance for activities such as best video, best letter, and best web page. The attendance rate for these two weeks was in excess of 99%. Minority (non-white) among the girls was 92%. These girls will complete two or more follow-up activities with QCC over the next year that include increasing computer-related knowledge and career and college planning.

Hwajung Lee

Research indicates that two key barriers facing female high school students when they choose science, technology, engineering, and mathematics (STEM) fields are (i) lack of support from family members, peer groups (e.g., other female students), and guidance counselors; and (ii) lack of female role models in the disciplines. These barriers also cause female students to leave the STEM fields at higher rates than male students when they encounter unexpected challenges or setbacks [1].

To promote female student recruitment and retention in the STEM fields, the College of Science and Technology (formerly the College of Information Science and Technology and the College of Arts and Sciences) at Radford University hosts the annual Summer Bridge Program (SBP). First, the SBP helps female students meet female role models in the STEM fields. The majority of instructors and teaching assistants in the program are female. Second, they also can establish a peer support group by meeting other female high school students who are interested in the STEM field. Third, they can experience an interesting aspect of the STEM fields by taking project driven classes.

In 2006, the SBP was held as a three day residential program with three Information Technology (IT) tracks: (1) Database, (2) Network, and (3) Web Site Design. In 2007, the program was expanded to a week long residential program with eight IT and mathematics tracks: (1) Database, (2) Network, (3) Web Design, Creation, and Scripting, (4 and 5) two tracks of Create Computer Games, (6) Math Teaching in the 21st Century, (7) Math Modeling and University Sportswear, and (8) Math in Rural and Global Communities. Each student took two tracks based on her preference. In 2008, the SBP will be expanded to encompass other STEM fields, especially the science fields. More information is available at <http://www.radford.edu/bridge>.

1. REFERENCES

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