INSPIRED: Promoting Diversity, Retention, Outreach and Globalization Readiness

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Abstract - The Increasing Student Participation in Research Development Program (“INSPIRED”), funded by a National Science Foundation Broadening Participation in Computing Grant, is designed to increase the participation of women and minorities in computing. This is needed to meet the growing demand for computer scientists and to strengthen the discipline by the infusion of their diverse ideas and perspectives. INSPIRED engages and develops students through an enriched research experience that includes mentoring, tutoring, and other support. INSPIRED is innovative in two respects. First, teams include students from all levels, freshmen through graduate students, and students can participate in multiple years. Secondly, the teams of students form the nucleus of a set of activities that are designed to retain and attract more students to computer science. Through involvement in outreach programs, INSPIRED students inspire others to enter and stay in the field. Working in diverse teams that include men and women from different cultures helps prepare students for the global workforce.

Index Terms - Broadening participation, diversity, retention, outreach, globalization readiness

INTRODUCTION

Demand for computer scientists is growing [1], but production of CS degrees has been declining [2]. Women and minorities are underrepresented in the discipline, and the participation of women has been falling rapidly in recent years [3-4]. This contributes to the shortage of computer scientists and hampers creativity by loss of diversity at the brainstorming table. Globalization of the discipline means that today’s computer scientists must be able to work with different cultures around the globe. This paper describes how the INSPIRED program is designed to promote diversity, retention, outreach, and globalization readiness.

THE INSPIRED PROGRAM

A Computing Research Association workshop on broadening participation in computing [5] identified many strategies that can be used for increasing participation of both women and minorities, including:
1. providing research experience for undergraduates;
2. protecting underrepresented undergraduates from isolation;
3. providing mentors and role models for undergraduates;
4. faculty mentoring;
5. retaining students by creating programs to keep them interested in computer science;
6. making students aware of the breadth of computer science and its benefit to society; and
7. outreach to K-12.

In fact, these strategies can benefit all students and increase participation in computing across the board [5].

The Increasing Student Participation in Research Development Program (INSPIRED) was designed to develop, retain, and recruit underrepresented students in computing through an enriched research program that uses these strategies.

INSPIRED is funded by a National Science Foundation Broadening Participation in Computing Grant for a three-year period that started in September of 2007. The program’s mission is to broaden participation in computing by increasing the number of women and minorities receiving computer science degrees. It is a comprehensive program that addresses all seven of the above strategies.

In this program, female and minority students participate in research and outreach activities in teams that are led by Computer Science Department faculty members who serve as mentors and role models. INSPIRED students are selected based on their grades, test scores, interests, and potential to contribute to the program’s mission. INSPIRED students must maintain a B average in their computer science courses. Students are...
paid a stipend for each semester and participate in research and outreach functions an average of 15 hours per week.

Teams include three to five students from all levels (freshman through graduate student). The higher-level students help to train and serve as mentors to the lower-level students. This stair-step mentoring from their peers enhances student development and inspires them to progress to the next level. Working in teams gives the students a supportive peer environment that protects them from isolation. Each team produces a formal research report and presents its research at a seminar each year. This enhances their communication and presentation skills, which also boosts their confidence.

Team research and mentoring are only two components in a comprehensive set of support and bridge activities for the targeted students. Research Seminars, Career Forums and Career Counseling Seminars make students aware of the breadth of computer science and its benefit to society and help transition students to advanced study or careers in computing. INSPIRED students coordinate these activities, which enhances their organizational skills.

The INSPIRED team of students itself forms the nucleus of a set of activities that are designed to retain and attract more students to computer science. Through their involvement in outreach programs to K-12, recruiting and mentoring other students, INSPIRED students can in turn inspire others to enter and stay in the field.

INSPIRED research areas include autonomous robotics, intelligent systems, computer architecture, and embedded systems, all of which are areas in which the faculty leaders teach and perform research. These areas complement each other and have many applications that are beneficial to society. Exposure to beneficial applications makes computer science appealing to all students [5, 6].

There is a large educational aspect in the INSPIRED program. The faculty mentors and more experienced students guide the newer students through a progression from graphical programming of educational robots for kids through design and implementation of more sophisticated autonomous robots that use a hybrid deliberative/reactive control architecture for autonomous agents. This reinforces concepts students learn in the classroom and helps prepare the students for research and outreach.

Carnegie Mellon University found that bringing their students’ personal experience of Computer Science to middle and high school students gets students excited about computer science [7]. INSPIRED students are actively engaged in outreach and recruiting. Activities include on-campus events, road shows, and summer academies. Knowledge gained from their INSPIRED experience, training, and research is incorporated into the outreach activities. The students take on progressively more challenging roles, beginning with informal interactions with prospective students at on-campus recruiting events and moving up to developing instructional materials and coordinating summer academies for middle and high school students. INSPIRED students are in turn role models to girls and minorities who participate in our outreach programs, thus promoting diversity.

Diversity and globalization readiness go hand-in-hand. The globalization of computer science makes it important for educators to give students cultural and communication skills to work with people from diverse backgrounds. INSPIRED is in its first year, but already it includes female and male U.S. citizens of African, Caucasian, Hispanic, and Philippine descent, graduate students from India, and faculty mentors from the U.S. and China. The Spring 2008 INSPIRED team is pictured in Figure 1. INSPIRED students learn to communicate and cooperate with team members from different cultures and backgrounds on a daily basis. INSPIRED includes a formal assessment plan to evaluate and document the program’s successes and failures.

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REFERENCES


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