RESPECT 2018 Panel Session on Revolutionizing the Culture of Computer Science

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Keywords

Culture; gender; social justice; diversity; change theory; industry; students; faculty.

1. SUMMARY

This session will explore the role that academic institutions and computer science departments can play in creating a revolutionary, real, and lasting change in the culture of computer science to create and promote an inclusive culture that values diversity and promotes social justice.

2. OBJECTIVE

It is well-documented that women and members of other groups are not well-represented in either education or professions related to computer science [1]. Research has shown that many popularly-held notions accounting for the disparity are inaccurate or simply false [2]–[7].

While several topical cases at Uber and Google [8]-[10] have re-energized this discussion in the news, in higher education and in industry, it is not a new phenomenon [11]. The phenomenon underpinning these issues reflects historical social barriers, but at the same time the costs of these issues to the future of computer science and society in general are very large [12].

The objective of this special session is to discuss the role of academic institutions and computer science departments in propagating positive, revolutionary change to this culture, and creating and extending research on how it can be done sustainably and in a manner that works within, but extends, existing organizational structures with existing faculty.

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3. OUTLINE

The participants in this special session are computer science departments who are recipients of the NSF IUSE: Revolutionizing Engineering and Computer Science Departments (RED) grant, each working to transform computer science education and spread this revolution to other computer science departments and fields. The institutions represented in this session are the University of Texas El Paso, the University of North Carolina Charlotte, East Carolina University, and Boise State University. Each team will give a short presentation on how their project is working to promote inclusion and transform the culture of computer science, followed by a 30-minute brainstorming session where ideas can be discussed and where teams can answer questions.

UTEP's project, "A Model of Change for Preparing a New Generation for Professional Practice in Computer Science," aims to foster understanding and appreciation of benefits of diversity in computer science. The first year of the project implemented training to facilitate (a) shared purpose and goals to create cultural competence and inclusive environments; (b) reflective dialog to produce a professional learning community; (c) strategies for accepting and integrating differing perspectives; and (d) asset-based approaches to engage students. In spring 2017, the evaluation team presented student climate-survey data, sparking dialog on the impact of student experiences. In May, faculty attended a workshop where they (a) heard summaries from a survey of all students, (b) received packets of raw, de-identified data representing differences across student populations, (c) participated in real-time analyses of questions of interest as they interpreted the data. This led to additional questions for follow up research. Surveys of faculty following the workshop indicate a value for interactive interpretation of student data, and willingness to engage in similar activities. Highlights of the project are collaborations with Google, New Mexico State University, and California State University Dominguez Hills to create one-credit hour courses focused on problem solving; collaboration with the Army Research Laboratory resulting in monthly cybersecurity workshops for all students; and a film series to trigger discussions on diversity and inclusion.

At the University of North Carolina, Charlotte, the Connected Learner project seeks to transform undergraduate education through a pedagogy that emphasizes learning from peers, learning through service to the community, and learning from real world problems in the profession. The research team includes faculty from CS and Organizational Science Departments, ensuring a multidisciplinary approach to organizational change. The project has transformed the introductory CS courses by using lightweight teams and flipped classrooms, resulting in students' perception that they feel part of a community by the end of their first semester[13],

[14]. Preliminary analyses of student data show that the project achieved significantly higher levels of retention of women and under-represented groups. New approaches to pedagogy are shared with faculty through the Summer Institute and by extending the changes to community service learning and learning from the profession.

At East Carolina University, Programmers to Professional Software Engineers aims to transform undergraduate Computer Science (CS) education through a set of complementary approaches. They include transform programming-centric computer science education approach to a systems-oriented and software engineering-centric one using open-source software, development of non-course-centric curriculum, infusing professional skills development processes into the entire curriculum, and dramatically increasing retention and graduation rates through inclusive pedagogy and personalization of teaching and learning[15]. We are currently developing personalizable teaching and learning materials for an introductory CS course.

At Boise State University, the "Computer Science Professionals Hatchery" seeks to transform undergraduate education by replicating the best elements of a software company environment, layering in moral, ethical, and social threads with entrepreneurship and professional skills. We have developed a - credit Foundational Values course for first-year students where case examples of bias in interpersonal and corporate interactions, and as reflected in products of computing professions are analyzed in a series of team-based activities guided by rubrics based on the social-justice theories of John Rawls [16]. This course will provide a consistent and usable scaffold of values and practices that can be adapted to other courses, further distributing the content through the curriculum, and further helping students become agents of change through computer-science education and professional practice.

At the conclusion of the presentations by the four RED teams, we will transition to a question and answer session followed by a group discussion of how to best approach achieving sustainable cultural change in computer science departments to include and support a diverse range of students.

4. EXPECTATIONS

The intended audience is members of computer science departments and any others who are interested in improving the culture of computer science. Attendees should learn about the latest research and approaches for creating lasting and meaningful changes in the culture of computer science.

5. SUITABILITY FOR SPECIAL SESSION

Most of the NSF RED projects are changing engineering departments and reporting to Engineering Education conferences. With this session we plan to bring the CS RED projects to a CS education conference. Our goal with this session is to encourage participants to begin their own thought processes on how they can approach the issue of cultural transformation within the context of their own institutions, and begin to build a community of like-minded practitioners committed to making computer science a more inclusive discipline.

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