Computer Science: Faculty Publications and Other Works

Faculty Publications and Other Works by Department

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Guest Editors' Introduction: Research on Equity and Sustained Participation in Engineering, Computing, and Technology

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RESPECT

Best of RESPECT, Part 1

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We're delighted to bring you this special issue on the Best of RESPECT, part 1! The IEEE Special Technical Committee on Broadening Participation conference, Research on Equity and Sustained Participation in Engineering, Computing, and Technology (RESPECT; http://respect2015.stcbp.org), was founded on the belief that engaging diverse groups of people in computing is a matter of equity—all people deserve the opportunity to solve increasingly complex global challenges.

In our quickly advancing field, the widening digital divide between those with the knowledge to create computational artifacts and those without basic functional literacy highlights the urgent and immediate need for research on how to interest and engage all people in computing. RESPECT promotes and showcases interdisciplinary research that draws on computer science, education, learning sciences, and the social sciences to build a strong community, theory, and foundation for broadening participation

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(BP) research. The inaugural conference, held 13–14 August 2015 in Charlotte, North Carolina, was co-organized by the STARS Computing Corps BPC Alliance and collocated with the STARS Celebration to leverage and engage the existing activist-oriented community in BP research (www. starscomputingcorps.org). The RESPECT and Celebration conferences shared a joint theme, "RESPECT for Diversity," that you'll find throughout this special issue.

The RESPECT'15 program provided insight into the current state of BP research through peer-reviewed full and short papers. The conference promoted lively discussion and inspiration to learn more about what engages and supports people from diverse groups, as well as the challenges and barriers diverse populations face in achieving equity. We accepted 10 extended versions of RESPECT work to appear in this current issue of *CiSE* and in the May/June issue. The five articles that you'll find in part 1 of this two-part series represent research on BP in computing at all levels of education: from K–12 schools through BS and PhD learners, with a focus on diversity with regard to gender, race, and ethnicity.

A key focus in many BP efforts is on getting K–12 students interested in and prepared for computing degree programs and careers. Two articles report on findings from integrating computer science education into K–12 with an eye toward diversity. In "The Impact of the Exploring Computer Science Instructional Model in the Chicago Public Schools," Lucia Dettori and colleagues highlight the impact of offering an introductory course in computer science based on the Exploring Computer Science curriculum in Chicago's large and diverse public school system. The course resulted in increased interest in further study of computer science for the majority of students, across both race and gender.

In "Collaboration and Gender Equity in Game-Based Learning for Middle School Computer Science," Philip Sheridan Buffum and colleagues note that students with different backgrounds often have different levels of experience with programming and with games, something that

emerged when they had middle school students learn to program in pairs in a game-based environment. This collaborative approach allowed female and minority students, who tended to start the exercise with less experience in both game environments and programming, to rapidly close this gap over the course of the activity, achieving similar scores on a posttest to their peers.

At the other end of the pipeline, few women and people of color are transitioning into faculty positions in STEM. As "Addressing Negative Racial and Gendered Experiences that Discourage Academic Careers in Engineering," by William H. Robinson and colleagues shows, many PhD students have negative perceptions of what it means to be an engineering faculty member, have witnessed or experienced gender and racial marginalization, and identify with the "imposter syndrome" in the STEM academic environment. The discrimination these students have experienced is usually in the form of micro-aggressions: subtle, indirect, and ambiguous demonstrations of discrimination that might even be unintentional on the part of offenders, but that can lead to self-doubt and isolation.

In "Representation of Women in Postsecondary Computing: Disciplinary, Institutional, and Individual Characteristics," Stuart H. Zweben and Elizabeth B. Bizot provide a detailed analysis of trends in female participation in postsecondary programs. By utilizing the US Department of Education's Integrated Postsecondary Education Data on computing graduates of US institutions from 1990–2013, they reveal important trends such as the increase in participation by women at the doctoral level being primarily due to nonresidents, and that participation at the undergraduate level has continued to decline.

Finally, in "What Influences Female Interest and Persistence in Computing?: Preliminary Findings from a Multiyear Study," Wendy M. DuBow and Laurie James-Hawkins present preliminary findings from a multiyear study of young women who showed interest in applying for NCWIT's Aspirations in Computing Award, which recognizes high school females' computing-related interests and achievements. The preliminary data suggest that recognitions such

as awards can be helpful for retaining women in the computing field.

Two articles in this special issue on the Best of RESPECT illustrate computing enrollment trends for women across race, ethnicity, program, and institutional type, and explore the experiences of African-American engineering students in graduate programs. The other three articles identify promising interventions that provide awards, support collaboration, and introduce computing into high schools with a newly designed curriculum. Together, these results help us build a richer understanding of the needs and landscape for women and people of color in computing. ▣

Acknowledgments

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