

Teaching Teachers to Teach Diverse Students in Computer Science:

Content and Resources for In-person and Online Delivery

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Abstract— The goal of this panel is to engage the computing education community in perspectives on developing and delivering diversity-focused faculty professional development. Panel session attendees will gain an understanding of the role and importance of diversity-focused professional development and knowledge about the critical instructional components that affect successful online and face-to-face professional development available to them and their colleagues. The panel is comprised of scholars who are both researchers and educators. They provide a range of experience developing and delivering professional development to high school, community college, undergraduate and graduate school computing faculty.

Keywords—*student diversity; professional development; computer science*

I. INTRODUCTION

Faculty professional development is often overlooked as an important component in our nation's efforts to diversify STEM fields. This panel will highlight some of the most successful projects to use instructor professional development to broaden the field of computing. The focus of this panel session is on increasing understanding and awareness of the importance of faculty professional development for broadening participation and diversity in computing. This panel will enhance the experience and knowledge of the session attendees by examining diversity-focused computing educator professional development, a central component for increasing the numbers and advancing diversity in the field. Unlike a regular session, panelists will share their lived experiences about the benefits and challenges implementing online and offline faculty professional development. The panel discussion will engage computing educators to reflect on, and improve further, their current professional development environments.

What is diversity-focused teacher professional development? Teaching teachers proven techniques both for attracting more and diverse students to computing classes and for implementing effective pedagogical practices that engage all students. Some of the most successful of these programs will be discussed by panel members in this session.

II. INTENDED AUDIENCE

This session will be of value to all FIE conference attendees, and especially those interested in ways to broaden participation in computing. While the focus of this panel is on computing, the topic should have value for anyone interested in increasing participation, and diversifying, STEM fields.

III. CONTENT

The topic of professional development, including content, resources, and on-line vs in-person delivery, will be discussed and debated. Results, experiences and strategies from diversity-focused professional development research projects such as Tapestry, Lighthouse CC and EngageIT will be discussed and reviewed.

IV. GOALS

The goal of this session is to educate educators on diversity-focused professional development opportunities and to engage in an interactive discussion on the content and resources available for teaching teachers to teach diverse students.

V. EXPECTED OUTCOMES

By the end of this panel it is expected that participants will understand the importance and potential for high quality professional development to improve diversity in computing and other STEM fields. Attendees will gain specific knowledge about programs available for different faculty groups.

VI. PANELISTS AND SPECIFIC QUALIFICATIONS

Panelists are drawn from multiple disciplines—social scientists, educational researchers and computing educators—to speak to different aspects of the professional development experience. The panel represents over 100 years of experience developing, delivering and implementing research-based instructional best practices.

James Cohoon, Associate Professor of Computer Science at the University of Virginia. Cohoon is an IEEE Computer Society Taylor L. Booth Educator Award winner. Cohoon's Chrestomathics project changed several institutions' introductory college CS1 curriculum using multiple pathways, active collaborative learning, integrated lecture and laboratory, and tailored examples and pedagogies. Locally, the project raised undergraduate women majors from 12% to 30% and achieved proportional representation for underrepresented minorities. Cohoon is also co-creator and leader of the Tapestry project that focuses on nationwide face-to-face professional development workshops for high school computing teachers. Unlike other high-school computing professional development efforts, Tapestry concentrates on proven efforts both for attracting more and diverse students to computing classes and for effective pedagogical practices that engage all students.

Lecia Barker, Associate Professor in the Information Science Department at the University of Colorado, Boulder and Senior Research Scientist for the National Center for Women & Information Technology. Lecia conducts research in attracting, retaining, and advancing groups underrepresented in professional computing and science careers; these studies focus on social climate, identity/belonging, faculty adoption of teaching and curricular practices, and sustainable organizational change. She advises several research and implementation projects intended to advance knowledge about computer science education. Lecia is currently studying faculty adoption of teaching methods in computer science.

Leslie Cintron, Research Scientist in the Department of Engineering and Society at the University of Virginia. A sociologist by training, Cintron's research is focused on gender, work, organizations and careers. She is Co-PI and lead social science researcher for Lighthouse CC, an NSF-funded project developing and testing a diversity-focused professional development MOOC for community college computing instructors.

Wendy DuBow, Senior Research Scientist and Director of Evaluation at the National Center for Women & Information Technology. She is currently conducting two multi-year National Science Foundation studies: (1) a mixed-methods study on the circumstances under which young women pursue (and do not pursue) computing/engineering, despite showing some initial interest in high school, (2) EngageIT, a mixed-methods study of the effects of training community college faculty on recruitment and retention strategies for women and minority students, and the extent to which that intervention has an effect on student outcomes.

Beth Quinn, Research Faculty at the University of Colorado, Boulder and Research Scientist for the National Center for Women & Information Technology. Quinn directs NCWIT's EngageCSEdu project, an online repository of course materials for introductory CS courses that are selected and peer-reviewed for their pedagogical quality and potential to engage diverse students. She also serves as director of research for the NSF-funded EngageIT project, which is constructing and testing new models of professional development for community college computing faculty. The goal of the PD is to empower faculty to use research-based means of retaining and recruiting women in their courses.

Jennifer Rosato, Assistant Professor in the Computer Science/Information Systems Department at The College of St. Scholastica. Rosato organized a Tapestry workshop in summer 2012 that led to the formation of a CSTA chapter in Minnesota as well as having a local NCWIT Aspirations in Computing Award program. Since then, she integrated many of the concepts and materials presented at Tapestry workshops into other professional development offerings. These include CS4HS workshops, the Mobile Computer Science Principles professional development course, and the online Computer Science Education Certificate offered through the College of St. Scholastica's graduate education program.

Luther Tychonievich, Lecturer in Computer Science at the University of Virginia. Tychonievich is active in promoting the training of instructional staff in diversity and pedagogical issues. He joined the Tapestry team in 2009 and has helped organize and run all but two of the Tapestry workshops offered since. He has designed the current undergraduate teaching assistant training program for the computer science department of the University of Virginia with an emphasis on pedagogical and tutoring practices that work well for diverse students. Tychonievich also collaborates with James Cohoon in the Chrestomathics project, helping to increase female enrollment in the computing majors at UVa to 30%. He also works with Dr. Mark Sherriff, Dr. Chris Gregg, and Dr. Ryan Layer on teaching children and teens from underrepresented demographic groups basic computing and programming skills, developing new pedagogical practices that have been published and adopted by several institutions.

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