Getting Out of the Shallow End: Techniques for empowering and encouraging underrepresented women in computing

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Abstract
As the prominence of Science, Technology, Engineering and Mathematics (STEM) education continues to grow, African Americans, Hispanics, Native Americans, and People with Disabilities are significantly underrepresented in academic studies and careers in STEM areas. The presenters of this panel analyze the existing challenges and the common issues faced with respect to women in these traditionally underrepresented groups pursuing degrees in computing fields by sharing useful strategies to attracting and retaining groups in computing fields. We will share our own personal experiences to motivate and encourage women to pursue computing fields by understanding and appreciating the unique cultural aspects inclusive to the group.

Audience
This panel is targeted toward all underrepresented minorities in Academia and those interested in recruiting and retaining them.

Introduction

According to the CRA Taulbee Report of 200-2010, 1.4% and 2.4% of students enrolled in Masters and PhD computing programs in the US are Hispanic, respectively. 2% of students enrolled in Masters and PhD computing programs in the US are African American. ½% are Native Americans. Considering that only 27.2% and 19.6% of enrolled students in Masters and PhD computing programs, respectively, in the US are female, the percentage of women who are from underrepresented populations is extremely low. [1]. To increase the equal participation of all in the computing profession, women from underrepresented groups should be encouraged to pursue computing fields.

Students who are deaf or hard-of-hearing (DHH) frequently are not well prepared for college. DHH students typically do not take advanced mathematics in preparation for college, and the majority of students graduate from high school with fourth-grade reading levels. Consequently, in the United States individuals who are deaf or hard-of-hearing are underrepresented in computing fields such as Computer Science (CS), Information Technologies (IT), and Networking. Less than one percent (1%) of the school-aged population is DHH. If we select Computing and Engineering as two examples of STEM fields of employment, deaf and HOH individuals have much lower rates of representation (as percentages of the deaf and HOH population) compared to their hearing counterparts. In computing, deaf and HOH representation is 69% that of their hearing counterparts (1.6% deaf and HOH compared to 2.5% hearing). In engineering, their representation is 79% by population (1.5% compared to 1.9%) [2]. The rate of deaf student participation in STEM-based majors at four year colleges is much lower than that of their hearing peers, and their rate of persistence is also lower. Hearing students graduate at a 15% higher rate than their deaf counterparts [2].

The U.S. Census Bureau data from the 2008-2010 American Community Survey 3-year Estimates indicated that 36.1 million people in America have a disability, approximately 12% of the population [3]. Within the disability population, approximately 73% had a prevalence of physical disabilities. The National Center for Science and Engineering Statistics indicated that approximately 1% of the earned doctorates have a disability [4].Among the science and engineering graduate

students, only 7% have a disability and within that population only 37% were female science and engineering graduate students with disabilities [5].

Plan of Action
Following are a list of possible questions for the panelist to encourage participation from the audience.

- What does the "Shallow End" refer to?
- What is preparatory privilege? How does it impact underrepresented minorities in CS?
- How do you feel about your acceptability in the computing field and in Academia?
- Have you felt like you are behind the mainstream in computing, i.e. in the Shallow End? If so, how have you coped with this feeling?
- What strengths do you possess that have helped you or are helping you to perform well in Academia? What personal values or traits do you have that are helpful to succeed in Academia and beyond?
- Have obligations to family and/or cultural groups effected your experience or performance in Academia and your visibility in your field?
- What recommendations do you have to increase the participation of underrepresented women in computing?
- Why is computing a good career choice for women from underrepresented groups?

Timeline is 40 minutes of questions like the ones above. The audience can intersect at any point and ask their own questions.

Outcomes
The panel aims to reach out to other students in the "Shallow End" and give them techniques for coping and succeeding in computer science despite the negative messages they may receive. The panel also hopes to raise awareness of the issue of preparatory privilege being misconstrued as innate ability and the detrimental effects this misperception can have on students with lesser preparation, but equal ability.. The panel aims to give Academics insight as to how to recognize, empower and encourage students from the "Shallow End."

MODERATORS/PANELISTS

Tom Armstrong, Ph.D., Wheaton College, Norton, MA (tarmstro@wheatoncollege.edu) - Moderator
Tom is an Assistant Professor in the Department sof Computer Science, Film & New Media Studies and Women Studies. At Wheaton College, he has been a strong advocate of increasing diversity in computer science. He founded the Wheaton Autonomous Learning Makerspace Lab and received a Fullbright to India in 2012 to examine the cultural differences between the two countries in terms of gender in computer science. He received his PhD from University of Maryland Baltimore County and his BS from University of Massachusetts Amherst.

Jane Margolis, Ph.D., University of California Los Angeles, Los Angeles, CA (margolis@ucla.edu)
Jane is a Senior Researcher at UCLA's Graduate School of Education and Information Studies. She is a social scientist and the author of two books on the inequities in computer science education. Her book Unlocking the Clubhouse: Women in Computing (MIT Press, 2002) examines the gender gap in computer science at the college level, and her book, Stuck in the Shallow End: Education Race, and Computing (MIT Press, 2008) examines the daily experiences of students and teachers in three Los Angeles public high schools, all with high numbers of African-American and Latino/a students. Margolis studies the interaction of structural inequalities and belief systems that perpetuate denied access of equal opportunities and segregation. Stuck in the Shallow End received the 2008 Prose Award in the Education category from the Association of American Publishers.

Karen Alkoby, Ph.D. , Gallaudet University , Washington, DC (karen.alkoby@gallaudet.edu)
Karen is an Assistant Professor of Information Technology program in Department of Business at Gallaudet University. Karen was the first deaf woman to receive a Ph.D. degree in Computer Science from DePaul University, Chicago in 2008. She has been teaching various areas such as programming, HCI, MIS and Software Engineering since she became faculty in January 2009. She was a coordinator and an instructor of a youth camp program on the campus, Greenfoot, in Summer 2011 for deaf and hard of hearing high school students across the country.

Kavita Krishnaswamy, University of Maryland, Baltimore County, Baltimore, MD (kavi1@umbc.edu)
Kavita is a Ph.D. student in the Computer Science Department at UMBC. She has a Spinal Muscular Atrophy, which is physical disability that limits her mobility. She attends classes and conferences remotely. Her research is involved in

developing robotic systems to provide assistance and increase independence for people with disabilities. She is a recipient of the NSF LSAMP Bridge to the Doctorate, Ford Foundation Predoctoral, and National Science Foundation Graduate Research Fellowships. She is interested in becoming a full-time professor, conducting research, teaching, and contributing to society.

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Patti is an Assistant Professor in the Department of Computer Science. She received her BA in Hispanic and Italian Studies from Johns Hopkins University, her M.S. and Ph.D. from the University of Maryland, Baltimore County in 2010 and 2012 respectively. Her research interests are in applying machine learning, data mining, and visualization to multivariate time series analysis, specifically to large repositories of clinical data. She is passionate about increasing underrepresented persons in Computer Science.

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