# RESET (Re-Enter STEM through Emerging Technology): Finding Re-Entry Pathways for Women

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## ABSTRACT

One of the critical needs of the 21st-century workforce development is the recruitment, retention, and graduation of women in STEM fields. Research suggests that women drop out of academic programs and leave the workforce to deal with financial setbacks, tend to personal obligations and offer service in military programs. It is important these women, i.e. returning women, have pathways for reentry to college and opportunities to advance their careers. Some areas within STEM fields, such as Emerging Technology (EmTech) in computer science are expected to experience increases in job opportunities more quickly than traditional areas. The demands of these jobs can only be fulfilled by creating pathways for untapped STEM talent pools, including returning women. Therefore, we propose a panel to discuss the barriers and opportunities women face (re-)entering the STEM education and career paths, especially in EmTech fields. The panel of experts will provide different perspectives to spark conversation and reflection. The objective of the panel is to share experiences, advice, and ideas to advance the current state of knowledge about the complex challenges that women encounter and support structures for their reentry to the education and professional pipeline.

## CCS CONCEPTS

• **Social and professional topics→Computing education programs.**

## KEYWORDS

Emerging technologies; re-entry programs; women in tech; bootcamps; internships; cloud computing

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## 1 SUMMARY

The disparity of women in STEM is quite evident as shown in the National Science Board's Science and Engineering Indicators While 47% of the American workforce with college degrees is female, only 26% of the STEM jobs are held by women [1]. According to National Center of Women and Information Technology (NCWIT), research suggests that women drop out of academic programs and leave the workforce to care for their families, deal with financial setbacks, tend to personal obligations and offer service in military programs [4]. Over 32% of women switch out of STEM degree programs in college [2]. According to the NCWIT, 56% of women with a technical education leave the workplace at the 'mid-level' point [3]. Of the 56% of women who leave STEM workforce, 50% wind up self-employed or using their training in a not for profit, 30% leave to a non-STEM more 'family friendly' career, and 20% leave to be stay-at-home moms [4].

The computer science industry is projected to grow much faster than other industries over the next 10 years. Some areas within the field are expected to grow job opportunities more quickly than others. Emerging Technology (EmTech) fields like cybersecurity, data science, mobile development, machine learning, and cloud computing will have thousands of jobs in the next decade which will require a large pool of technical people to fill. It is timely, and perhaps imperative to build the capacity of returning women by enabling them to complete EmTech academic degrees and secure professional jobs. The field of EmTech can use this untapped potential to fill the gap in the EmTech job sector, which is growing at a rapid rate, yet, very few returning women join those fields because: 1) these fields are constantly evolving; 2) the technical preparation can be challenging; 3) technical skill development requires a lot of time and effort; 4) there are not enough transitional programs that leverage the existing background of returning women to develop new knowledge, and 5) industry and academia do not have enough knowledge to create (re-)entry pathways to prepare returning women for the real world.

Research studies focused on challenges and potential solutions on female students entering the STEM pipeline. However, there is not much research focused on identifying challenges and solutions for women who (re-)enter academic or professional pipeline of EmTech fields. Hence, the goal of this panel is to discuss and share

the current state of knowledge on what will support women to (re-)enter the education and professional pipeline especially after a career break; and to contribute to an improved understanding of the complex challenges that women encounter in EmTech disciplines. It is intended to provide a platform to discuss and suggest recommendations about the individual, programmatic, institutional, evaluation-based, and evidence-based strategies that can enable women to (re-)enter the EmTech pipeline in greater numbers.

## 2 PANEL STRUCTURE

The moderator, *Dr. Farzana Rahman*, with expertise in mobile application, will provide the panel background and motivation and introduce the panelists. Each panelist will be given 10 minutes to present their respective positions. *Dr. Elodie Billionniere* will share her expertise in how to design and deliver effective strategies for females to (re-)enter cloud computing related academic and career paths. *Dr. Quincy Brown* will discuss the policies that can enable educational and professional organizations to create more inclusive and accessible programs for returning females. *Dr. Ann Quiroz Gates* will share her expertise in how returning female can join or (re-)enter the field of cybersecurity. Following the presentation, the moderator will facilitate audience discussion in small groups to brainstorm and identify a collective solution to various questions related to the challenges that returning women encounter when (re-)entering EmTech fields. Compilation of the group discussion with the list of the top three challenges/strategies will be identified for each question and the floor will be open for discussion as a whole group.

Through this panel, we aim to reach a broader audience who is interested in presenting research findings and scholarly related to re-entering women during the 2021 NSF RESET conference. The NSF RESET conference aims to advance the current state of knowledge and understanding on what will support returning women to (re-)enter EmTech pipeline, especially after a career break. Hence, upon completion of this panel, the attendees will have access to a networking community whose expertise is to

**(a)** discuss effective strategies having a real impact on bringing more females in EmTech fields
**(b)** explore and identify barriers and challenges for women to (re-)enter EmTech fields
**(c)** identify strategies used by women currently to (re-)enter the educational and professional pipeline of EmTech fields
**(d)** list out existing programs, career options and skill building opportunities on EmTech degrees and profession
**(e)** facilitate greater dissemination and exchange of expertise, which can generate effective and innovative pathways for women's (re-)entry in EmTech disciplines

## 3 ELODIE BILLIONNIERE

As an Associate Professor at Miami Dade College, the largest undergraduate Hispanic-serving institution, I lead efforts to raise cloud literacy in partnership with Amazon Web Services to meet the local and national workforce demand. Our Cloud Computing Center hosts all the cloud computing classes, high school summer bootcamp, accelerated programs, certification training, workshops, and conferences.

## 4 QUINCY BROWN

As the Senior Director of Innovation Research at AnitaB.org., I lead efforts to support entrepreneurs and founders as well as research and evaluation activities. I was previously a Program Director for STEM Education Research at the American Association for the Advancement of Science and a Senior Policy Advisor in the White House Office of Science and Technology Policy. I am a co-founder of blackcomputeHER.org, which provides introductory data science skills and professional development opportunities to black women in technology.

## 5 ANN QUIROZ GATES

As an AT&T Distinguished Professor and Chair of the Computer Science Department and past Associate VP of Research and Sponsored Projects at the University of Texas at El Paso, I direct the NSF-funded CyberShARE Center of Excellence that has a mission to advance education and research through cyberinfrastructures that support information exchange and integration, as well as collaborative interdisciplinary research.

## 6 FARZANA RAHMAN

As a faculty and the PI for the NSF INCLUDES DCL: RESET Conference, I developed and taught various courses on mobile development. I am the founder of BWCSE, the first platform mentoring Bangladeshi women in computing, a recipient of the ABI Systers PIO (Pass-It-On) award, NCWIT Extension services grant and co-chair of the Academic Track of Grace Hopper Celebration. I also directed a "tiered mentoring program" and an REU to diversify the face of mobile development community.

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