

# Role of Academia to Create Re-entry Pathways in Computing

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**Abstract**— Although most higher education institutions cater their programs to traditional college students, high school graduates or those in their early 20s, the adult-student population makes up most degree-seekers in the United States (U.S.). Adult-student population, known as non-traditional students, includes students who are returning to postsecondary institutions after dropping out, working adults, formerly incarcerated individuals as well as professionals who want to turn life experience into college credit. With the influx of non-traditional students, higher education institutions must rethink and put in place strategies to better support these students. With this in mind, recruitment of non-traditional students in computing related fields is of great interest to increase the number of graduates to meet the future of the workforce needs in particular in the emerging technology (EmTech) fields. Therefore, we propose a panel to discuss opportunities for re-entry computing education and career paths. The panel of experts will share their respective re-entry programs to spark conversations and reflect on their work-in-progress. The objective of the panel is to share experiences, lessons learned, and ideas to create and promote initiatives to support structures for re-entry to the computing education and professional pipeline.

**Keywords**— *computing education; non-traditional students, formal and informal learning; academic degree; emerging technology*

## I. SUMMARY

While significant efforts have been made in recruitment, retention, and graduation of traditional students, particularly underrepresented minority groups, in computing related fields there is a fast-growing interest to bring non-traditional students into the computing pipeline through both formal and informal learning settings due to the rise of the non-traditional student demographic at colleges and universities across the U.S. According to the National Center for Education Statistics, enrollment in degree-granting colleges of students ages 25 to 34 years old increased by 35% between 2001 and 2015. The enrollment is projected to increase by 11% between 2015 and 2026 [1].

With the computing job industry projected to grow much faster than other industries over the next 10 years [2], some niches within the field, such as machine learning, data science, cybersecurity, mobile computing, AI/ML and etc., are expected to grow job opportunities more quickly than others. The demands for computing jobs throughout the nation can only be fulfilled by creating opportunities for the largest untapped talent pool, which is returning learners, meaning individuals who had a career break or wants a career switch to make their way back to workforce. In addition, formerly incarcerated individuals are

part of the untapped talent pool too. By exposing them to in-demand computer science (CS) skills in the area of emerging technology (EmTech), former prisoners will have a better opportunity to transition into the workforce with high wage positions and as such the less likely they will return to crime [3]. Hence, it is timely, and perhaps imperative to build the capacity of returning learners by enabling them to (re-)enter the computing related academic degrees, so they can fill the void of next generation computing jobs. However, academia has very strict decorum which offers little to no access to diverse pathways for returning learners to re-enter the computing related academic programs. Even though there has been an increase in the number of informal learning pathways to enter into computing fields, there is no solid evidence and understanding of how such informal learning paths facilitate adult learners to learn CS skills that enable them to rewrite their career paths [4].

To facilitate greater discussion on this critical, yet timely topic, we propose a panel with a goal to brainstorm and discuss best practices about – a) what do academic institutions lack to facilitate an easier transition of returning students, who may not have any relevant background, into computing/CS academic programs, b) what can be done by academic organizations to develop academic programs targeting non-traditional learners, c) what are the limitations of current computing/CS curricula for returning students to get into (or even enroll in classes with a focus on) EmTech topics, d) how do learners returning from career break interested in computing/CS, fit within today's and tomorrow's workforce consisting of many EmTech specialties, and e) what can academia, specific to computing/CS disciplines, do to create more inclusive environment and pathways for learners who are interested in returning to computing/CS related educational pipeline.

## II. POSITION STATEMENTS

### A. Elodie Billionniere (Moderator)

As an Associate Professor at Miami Dade College, I lead efforts to raise cloud literacy in Miami-Dade County with a NSF ATE project Dade Enterprise Cloud Computing Initiative (DECCI) in partnership with Amazon Web Services. DECCI provides students with project-based learning opportunities and access to leading AWS technology, giving them a competitive advantage by strengthening academic offerings that lead to not only an academic credential, but also an industry certification to meet the workforce demand. Our Cloud Computing Center hosts all the cloud computing classes, summer bootcamps, accelerated training, workshops, and conferences.

### B. 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.

### C. Farzana Rahman

As an Associate Professor, I had developed and taught various courses mobile development, secure mobile computing, and mobile healthcare. I am the founder of BWCSE, the first platform, aiming to elevate the status of Bangladeshi women in computing research and education. The impact of this platform includes over 10 thousand female computing students using the platform and resources to advance their career to diversify the pipeline of computer science professionals. I directed a “tiered mentoring program” and an REU with the help of multiple industry grants to diversify the face of mobile development community

### D. Hyunjin Seo

As an Associate Professor and Docking Faculty Scholar in the School of Journalism and Mass Communications at the University of Kansas, I serve as the founding director of the KU Center for Digital Inclusion. Currently, I am leading a National Science Foundation-funded program offering evidence-based technology education to women who were formerly incarcerated and are now restarting their lives outside the criminal justice system. Through this three-year project, my team is developing curriculum and online modules to broaden technology education to this and other underserved populations who are re-entering the tech workforce and education pipeline.

## III. PANEL STRUCTURE

The moderator, Dr. Elodie Billionniere will provide the panel background and motivation and introduce the panelists. Each panelist will be given 10 minutes to present their respective positions. Dr. Farzana Rahman will share her expertise in designing and delivering effective strategies for re-entry into computing academic degrees through mobile computing related courses, bootcamps and informal learning paths. Dr. Quincy Brown will share the curriculum and insights about BlackcomputeHER Data Science Executives program re-entry of professional Black women. Dr. Hyunjin Seo will share her experience in developing and facilitating evidence-based technology education, in formal and informal settings, to formerly incarcerated individuals and are now restarting their lives outside the criminal justice system. 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 and lessons learned with the implementation of re-entry programs targeting non-

traditional students in computing discipline. Compilation of the group discussion documents with the list of the top three challenges/strategies will be identified for each question and the floor will be open for further discussion as a whole group. We will create a mailing list consisting of interested panel participants to stay connected after the conference and to share the panel summary with discussion points.

Through this panel, we aim to reach a broader audience who is interested in advancing the current state of knowledge and understanding on what will support non-traditional learners to reenter computing discipline. Hence, upon completion of this panel, the attendees will have access to a networking community of educators and industry professionals whose expertise is to:

- identify what academia lacked before, what it lacks now and what can be done by academic organizations to develop academic programs targeting non-majors and non-traditional students.
- identify limitation of computing and/or CS curricula to have a concentration in (or even enroll in classes with a focus on) emerging technology such as cybersecurity, data science, cloud computing and etc.
- explore and identify barriers and challenges for re-entry computing and/or CS discipline.
- identify strategies used currently to reenter the educational pipeline of computing and/or CS discipline.
- discuss interest-based learning approaches for adults who lack prior experience in computing and/or CS discipline.
- list out existing programs, 2 year to 4-year transitional programs, informal learning settings and skill building opportunities for computing and CS discipline.
- facilitate greater dissemination and exchange of expertise, which can generate effective and innovative pathways for re-entry in computing and/or CS disciplines.

## REFERENCES

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