Engaging HBCU Faculty in Project-Based Learning in Silicon Valley[*]

Panel Discussion

Faculty that teach computer science at historically black colleges and universities (HBCUs) have unique experiences and challenges that impact the way they create curricula. This special session will discuss challenges facing HBCUs and how industry- academia partnerships can assist in creating curricula that is not only engaging but helps to involve the students in their own education using project-based learning. We will also explore how HBCUs can work together to develop interactive, creative shared knowledge that will help prepare students for the future; whether that be careers in Silicon Valley or graduate school. This panel includes participants from the Google-sponsored workshop Faculty In Residence (FIR) Program that was held in the Summer of 2017.

Faculty in Residence (FIR) program was envisioned to assist faculty at HBCUs bridge their prior experience with curriculum development and allow them to be immersed in Silicon Valley culture and practices. The six-week experience permitted approximately thirty faculty from HBCUs to work alongside Silicon Valley engineers to create curricula that is designed for teaching introductory programming courses, applied data structures, mobile applications, machine learning, or cybersecurity. Participants engaged in workshops related to active learning, flipped classroom, code reviews, and technical interview do's and don'ts. Also, faculty were educated about the successes of existing programs like Google's Computer Science Summer Institute, Hampton University's Applied Computer Science Summer program, and the HBCU Google In Residence Program.

Prior to attending the FIR Workshop, faculty members were asked to create at least two goals that they would work to achieve as a result of the program. These goals had to relate to curriculum development, research connections, and/or work products that could be used directly in the classroom for the upcoming Fall semester. Additionally, faculty were asked to think out of the

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ordinary curriculum box and participate in design thinking to create interactive, fun, yet challenging learning experiences.

To support the work being performed by the FIR participants; Google also delivered events and opportunities that faculty could take back to inform their students on the technical interview process. Faculty were informed of Google's "Skill Builder Series" that delivers information on topics such as interview preparation, maximizing an internship, and technical skills (language specific, platform specific development, software version control).

Panelists include faculty from Howard University, Shaw University, and Coppin State University each with their own unique experiences from FIR. Questions to be addressed during this panel include:

- What are current strategies (specific to Howard University, Shaw University, etc.) that have been working at HBCUs to increase diversity in Computer Science?

- What was the experience of the students coming into the Courses?

- What Was the expectation (if any) of the faculty coming into the FIR Workshop?

- What techniques were faculty able to leverage successfully in their classroom after the FIR Experience?

- What are the lessons learned or improvements that you think Google and HBCUs can leverage for future FIR activities?

Panelists

The faculty chosen to participate on this panel in no way represent all the innovative persons that participated in the six-week thought-provoking workshop. However, they represent the varied missions and cultures of HBCUs today showing that these institutions are not homogenous. These faculty biographies are provided below.

Legand Burge III, Ph.D. is a Professor of Computer Science at Howard University in the Electrical Engineering and Computer Science Department (EECS). Dr. Burge was instrumental in creating various academic-industry partnerships for Howard University, including the Google In Residence program[1]. The GIR program is designed to bring Silicon Valley engineers into HBCUs to teach programming courses from an industry perspective. This program and its success has spread to approximately ten HBCUs and continues to gain popularity. Additionally, Dr. Burge was a key architect in helping to think through the FIR program with Google thought leaders. He realized that one company

alone cannot reach all the 110 HBCUs in the U.S. He knew that teaching the faculty industry practices could help underrepresented students gain a leg-up in the technical interview process and in Silicon Valley practices. Additionally, Dr. Burge was one of the key architects of establishing and outlining the Howard-West initiative with Google that started immersing HBCU students in Silicon Valley culture, projects, and problems.

Dr. Burge's research interests lie in the field of distributed computing and in global resource management in large-scale distributed systems. Dr. Burge is currently the director of the Distributed Systems Research Group (DSRG) and associate director of the Center for Applied High Performance Computing at Howard University. Dr. Burge is also interested in Computer Science Education and Diversity, and Tech Innovation and Entrepreneurship. Dr. Burge is a AAAS Fellow, and Fulbright Scholar recipient.

Leshell Hatley, Ph.D. is an Assistant Professor of Computer Science at Coppin State University in Baltimore, MD and is the Founder and Executive Director of Uplift, Inc., a nonprofit STEM education organization. Uplift offered the first mobile application development course to middle and high school students in the US and is one of the first organizations to offer after school courses in Lego Mindstorms Robotics in Washington, DC. She and the students in her research lab at Coppin State, the Lab for Artificial Intelligence and its Applications (LAIA), won the 2016 USA White House HBCU (Historically Black Colleges and Universities) Maker Innovation Challenge and she recently led the first Coppin State Team to compete in the NASA Swarmathon. She is a passionate computer engineer, educator, and researcher who continuously combines these three attributes to create innovative approaches to teaching STEM concepts to students between that ages of 3 and 73. With over 20 years of teaching experience, Dr. Hatley leads teams of enthusiastic students, dedicated volunteer instructors, and teams of engineers to achieve award winning success, national news coverage, and innovative technology product designs. Gloria Washington, PhD

Gloria Washington (Moderator), PhD is an Assistant Professor of Computer Science at Howard University. At Howard, she runs the Affective Biometrics Lab and performs research with her students on human-centered computing and computer science education. She currently teaches the introductory programming courses at Howard using the C++ programming language. Through her work in creating engaging curricula for these classes; she is also researches technologies that can measure the engagement of the students and adapt lessons as needed. She led the first woman graduate from Howard's newly minted Computer Science PhD program. Additionally, she runs a coding and tech entrepreneurship program called #WatchMeCode Tech Innovation Experience. Through this program, she works with local high schools in the

Washington, DC area to assist teachers with introducing coding to their students. With the #WatchMeCode program, she hires currently enrolled Howard University comp sci. majors to teach introductory, fun subjects to young black males such as Coding Robotics Using Spheros and Block Chain Programming for High-Schoolers. This helps the Howard students take ownership of the work they are learning in their classrooms.

Before coming to Howard University, she was an Intelligence Community Postdoctoral Research Fellow in the Department of Computing Science at Clemson University. She performed research on identifying individuals based solely from pictures of their ears. Dr. Washington has more than fifteen years in Government service and has presented on her research throughout industry. Ms. Washington holds M.S. and Ph.D. in Computer Science from The George Washington University, and a B.S. in Computer Information Systems from Lincoln University of Missouri an HBCU.

Lloyd Williams, Ph.D. is an Assistant Professor at Shaw University in Raleigh, NC. He received a B.S. in Philosophy from Vanderbilt University. After completing a Ph.D. in computer science from NCSU, he joined the CS faculty at Shaw University in 2011. He brought a passion and love of students to teaching that drew his students to computer science. He was promoted to Department Chair for Computer Science two years later and Program Director for Science and Technology Innovation three years after that. He has personally mentored minority computer scientists who have gone on to work at companies including NASA, Intel, Google, Glaxo, US DOD, US DHS, Fidelity Investments, Cisco, ATT, Lenovo and IBM at starting salaries as high as $80,000. He was recognized as the 2017 STEM Educator of the Year by the Research Triangle Park Foundation's STEM in the Park Initiative.

Dr. Williams personally created the Shaw Innovation Laboratory, taking a former storage room and creating a lab that has been awarded over $600,000 in funding in 2016 alone, including a recent $400,000 NSF award to create the Shaw University Center for Computer Science Living, Learning and Research. His Shaw Innovation Lab has brought cutting edge to students both at Shaw and from K- 12. Dr. Williams founded the Shaw Computer Club in 2011 (www.shawcc.com). The club has conducted STEM outreach with K-12. The club has striven to create strong ties with industry, including Citrix, Red Hat, Cisco and HP. He has hosted Google engineers to teach app development to Shaw students for two semesters and he worked as a Faculty in Residence at Google's Mountain View headquarters in Summer 2017 where he created an innovative virtual reality project that he has incorporated into his software engineering class for Fall 2017 and hopes to deploy at other schools as well.

Acknowledgment

References

[1] WASHINGTON, A. N., BURGE, L., MEJIAS, M., JEAN-PIERRE, K., AND KNOX, Q. Improving undergraduate student performance in computer science at historically black colleges and universities (hbcus) through industry partnerships. In *Proceedings of the 46th ACM Technical Symposium on Computer Science Education* (2015), SIGCSE '15, pp. 203–206.