BLACK WOMEN IN COMPUTING: A RESEARCH AGENDA

The Social and Behavioral Structures at Play for Black Women in the Computing Sciences

Final Workshop Report

February 2016

Computing and Intersectionality:

The Social and Behavioral Structures at Play for Black Women in the Computing Sciences

Final Workshop Report

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EXECUTIVE SUMMARY

This two-day workshop explored the intersectional experiences of black women in the computing sciences and formulated strategies into an actionable plan that addressed the lack of awareness and action around this intersectionality. Twenty-four black women in computing representing universities, industry, and government participated in the workshop, identifying the following seven themes:

- Theme 1: Linking black women in computing to the bottom line for accountability
- Theme 2: Developing key influencers and thought leaders
- Theme 3: Increased cultural and educational supports for black women in computing
- Theme 4: Leadership development
- Theme 5: Lack of collective research about black women in computing
- Theme 6: Our voices: Illuminating our trials and triumphs
- Theme 7: Branding and communication

The participants discussed key issues, concerns, and strategies for each theme. They created an action plan of next steps for each, creating an initial working tem and assigning a lead for each theme.

INTRODUCTION

From 1994-2012, the percentage of black women entering college has risen from 48%-62% (Lopez & Gonzalez-Barrera, 2014). However, nominal numbers of black female students choose STEM pathways; even fewer complete STEM undergraduate degrees, or obtain masters or doctorates in STEM fields (Casey, 2012; National Science Foundation, 2013). Moreover, black women tenure-track professors remain significantly underrepresented in STEM disciplines (Rankins, Rankins, & Inness, 2014). The underrepresentation of black women, given their increased college attendance, is highly problematic.

Though it is expected that fewer individuals actually pursue a terminal degree in CS, it is clear that at every point in the ecosystem, the number of African Americans in particular are underrepresented (in proportion to their percentage in the US population) (Zweben, 2013; Margolis, 2008). In 2008, of the roughly 20% of women who were awarded bachelor's degrees in Computer Science (CS), only 5% were minority women ("Women, Minorities, and Persons with Disabilities in Science and Engineering", NSF 2012). With respect to black women as underrepresented minorities in CS, the most recent data reveals that in the US, 3.6% of undergraduate, 1.6% of master's, and 1.2% of doctoral degrees were conferred to African Americans

(Zweben, 2013). This lack of ethnic diversity within gender diversity compounds the exigent need to promote and support black women into the science and engineering (S&E) pipeline.

Intersectionality of Race and Gender

To promote more black women into the S&E pipeline, there has been an emphasis on academic preparation in STEM. Efforts to increase the participation of this group range from in-school efforts, such as CODE2040 and Facebook's newly created TechPrep program, to career programs intended to recruit minority professionals -- and by extension, black women -- such as Intel's Diversity in Technology initiative. All of these interventions seek to promote, teach, and/or train black women throughout the S&E pipeline. Nonetheless, we continue to see disparity in the number of black women in computing careers.

Further, there is a great deal of literature that examines why women do not pursue CS as well as why African Americans do not pursue CS (Zarrett & Malanchuk, 2005; Hill, Corbett, & St. Rose, 2010). However, there is a scarcity of literature that focuses on the intersectionality of gender and race to begin to explore more deeply how that intersectionality impacts black women in the CS pipeline (Cantor, et al, 2013).

There are countless efforts that purport to increase minority participation in computing; however, the field is not seeing an increase in these numbers, nor is the

landscape for computing education improving for minority students.

For black women, their educational experiences in computing and the role those experiences play in persisting in CS are often not a focus of study. There are often no – or very few – black women in computing programs, so there is no opportunity to form homogeneous networks of shared experiences. Black women do not talk openly about their negative experiences for a variety of reasons. These experiences range from being ostracized for being different (e.g., peers [or professors] do not want to work with black women) to the possibility that raising concerns around inequality can result in being labeled as the overly aggressive or the "angry black woman" who do not take their academics seriously. Black women's experiences simply differ from other women's experiences. The "double bind" nature of black women's participation in STEM ensures that issues of discrimination are indistinguishable from gender or race. Within the computing community, awareness about black women's experiences is closeted. As the computing education

A shared learning experience is a hallmark of education, and black women often lack opportunities to form shared experiences in their respective departments and graduate programs, in particular.

experience for black women is different from other groups, it is important to unpack these differences to better understand the nature of this silence. (It should be noted that other women of color groups, such as Hispanic and Native American, may have similar experiences, but further research is needed.)

The dialogue around broadening participation in computing must change from focusing mostly on women to one that focuses on the intersectionality of race and gender if the computing educational community is to be more inclusive. Engaging more diverse perspectives in computing education can be described as a social justice issue. More specifically, to succeed in increasing the participation of black women in computing, there must first be an acknowledgement that black women's experiences in computing is different from other groups. Subsequently, an educational framework can be developed to address these differences. For example, exploring white privilege in the context of computing education would facilitate rich discussion of experiences (and solutions) for black women students and professionals. This would also lead to the development of intervention strategies that actually work for black women across their educational and career pursuits.

Purpose and Goals of the Workshop

This workshop explored these differences, which can be represented broadly by the intersectionality of race and

gender, to contribute to the body of computer science education research.

The goals of the two-day workshop were to 1) explore the intersectional experiences of black women in the computing sciences, and 2) formulate strategies into an actionable plan that will address the lack of awareness around this intersectionality.

Guiding Questions During the Workshop

There were three main guiding questions during the workshop:

1. Why don't interventions for women in computing work for black women in computing? For example, how are white women's experiences at the Grace Hopper Conference (GHC) different from black women's experiences at GHC?
2. What are the implicit and explicit gender and stereotype biases for black women in computing? For example, what are the stereotype threats, implicit biases, isolation management strategies, etc. for black women, and how do they differ from the experiences of other women?
3. What are tangible intervention/ support strategies for black women in computing? For example, can we develop strategies for attending technical conferences, creating a

model for computing education that includes culture-specific content?

For two days in January 2016, 24 black women in computing representing academe, industry, and government convened to discuss these guiding questions and strategize over how to improve the experiences, and success rates, of black women in computing.

The workshop included small-group breakout sessions to discuss these guiding questions, and then culminated in a whole group discussion and action planning. Through the breakout sessions and group discussions, the participants identified seven themes.

This final report features the identified themes, as well as the next steps and action plan to promote and support black women in computing. This report describes data collected from the workshop, and seeks to inform the larger STEM+C research community of the specific factors associated with black women in computing. These results may also speak to women of color in computing more broadly, though additional research is needed.

THEME 1: LINKING BLACK WOMEN IN COMPUTING TO THE BOTTOM LINE OF ACCOUNTABILITY

There are on-going initiatives and programs to promote diversity in computing, including programs geared towards black girls and women. Participants talked about Black Girls Code for kids, Grace Hopper Conference for researchers and practitioners, and funders such as NSF to "broaden participation" in computer science. President Obama recently launched a new initiative called CS for All, which aims to give all students an opportunity to learn CS. And yet, the number of black female computer science students and professionals are dismally low.

In brainstorming why the representation of black women in computing was low, the workshop participants discussed "the bottom line of accountability": to increase the numbers of black women in computing.

To do so, there is a "need to identify the types of interventions based on metrics and solid data" as noted by one participant and echoed by others during a breakout session. Building solid evidence of what works, why or why not, and the long-term impacts to have more black women in the computing field was discussed throughout the workshop.

The participants talked about the need for targeted recruiting at the K-12, higher education, and industry levels. In academia and industry, institutions and employers can actively seek out black women faculty or students (i.e., Tapia, NSBE, ADMI, HBCUs, ABET) who accept an offer (i.e., for grad school, faculty position). Institutions can consider high school as a potential venue for recruitment, building partnerships with districts and high schools.

THEME 2: DEVELOPING KEY INFLUENCERS AND THOUGHT LEADERS

One key area to promote more black women in computing is to engage more black women leaders in computing as key influencers and thought leaders in the field. Participants discussed a two-fold approach: 1) "Getting a seat at the table", and 2) "Being prepared to take action once you get there."

> *"The workshop helped me to understand the importance of promoting my accomplishments and branding."*

Discussions included individual development, group development, and organizational development. For individual development, one respondent learned the importance of promoting oneself, and wanted to take part in "training on how to promote yourself, the best venues for discussing your accomplishment."

For group development, the participants discussed how black women in leadership positions (at the workshop) could help facilitate, mentor, and nominate other women to leadership positions. Leadership positions included chairs of committees at a university/ college,

professional organization, or journal. One participant noted in a survey, “I learned that you need to cultivate connections with the ‘gatekeepers,’ those who can give you access to the resources and opportunities that further your career or circle of influence (e.g. IEEE Fellow or serving on the board of key organizations).”

For organizational development, there was mutual agreement on the need for institutions of higher education and industry to promote diversity in the leadership ranks. Another line of inquiry was issues around founding and initiating one’s own group, whether it be a business, a conference, a book, a journal, or some other organizational mechanism to become thought leaders in the field.

THEME 3: INCREASED CULTURAL AND EDUCATIONAL SUPPORTS FOR BLACK WOMEN IN COMPUTING

For black women in computing to be successful, the participants all agreed on the critical need for more cultural and educational supports. The participants unpacked the definitions of both cultural and educational supports. They also discussed the need to describe these supports for black women, conduct research that defines cultural supports making black women the focal point of the research, and provide peer groups and mentors.

Cultural supports identified and discussed included:

- Community (group of black women/men to share, grow, feel supported)
- Spirituality
- Extracurricular (i.e., hair, personal life including relationships, family, self-care, healthy living/lifestyles)
- Authentic (accountable) affinity groups (i.e., such groups should not be part of a checklist, but should offer measurable, actionable support)
- Cultural competence

Educational supports identified and discussed included:

- Advocacy (Sponsorship)
- Expanding the expectation and understanding of what a computer scientist is, and how to become one, for both black women (students) and educators (who say, “you’re not good at math, so you won’t make a good computer scientist”)
- Establish our awareness that ‘black women’ refers to African American women in the US, but also includes black women of Caribbean and African descent who are currently living in the US from other countries. ‘Black women’ is a much more inclusive term.
- The importance of embracing the phrase ‘black women’, compared to ‘women of color’ and ‘people who look like me’ became increasingly important, and even celebrated among the participants.

Also, rather than merely describing the low matriculation, graduation, and employment rates of black women in computing, the participants discussed the need to be more intentional in describing the plight of black women in computing and its impact on other aspects of their lives outside of computing (e.g., health, family, wealth, spirituality, etc.).

THEME 4: LEADERSHIP DEVELOPMENT

Similar in tenor to Theme 2 regarding key influencers and thought leaders, Theme 4 focused on personal leadership skills development. During breakout sessions, where the small groups had a diversity in age, role (e.g., untenured, tenured, chair of program, entrepreneur, industry professional, executive), and research interests in CS, there was active discussion about how to build leadership skills. After all, during graduate school the focus is on learning computer science concepts and skills, and not necessarily on explicitly learning leadership skills.

> *"I learned ways to make sure my voice is powerful yet tactful so that I'm not dismissed."*

The participants discussed the needed skill set for building political acumen, such as in the university setting, to meet the rigors of tenure. This included how to get on national committees, how to prepare for tenure, and how to prepare honors and awards applications in the field. This turned to how the participants can help one another, such as nominating other black women in computing for awards and partnering with CMD-IT (the Center for Minorities and Persons with Disabilities in Information Technology) and CAHSI (the Computing

Alliance for Hispanic-Serving Institutions). Such partnerships could also be parlayed into collaborative conferences.

Responses from the breakout and post-workout survey responses show that for some participants, the workshop, itself, represented an “ah-ha” moment. One respondent replied that a major benefit to the workshop was “tips for navigating academia if you feel shut out of an area”. Another respondent stated, “I learned that entrepreneurship can be a valid solution to many of the challenges we're facing. I realized what a small but tight-knit community/family this is.”

THEME 5: LACK OF COLLECTIVE RESEARCH ABOUT BLACK WOMEN IN COMPUTING

The participants discussed the importance and the need for more research about black women in computing. They also acknowledged the tension between wanting to address the lack of research and not wanting to become subjects (e.g. “lab rats”) of social science research.

Participants discussed the imperative to collaborate and partner with social scientists and to create inter-disciplinary research teams to explore and produce credible and sound research about black women in computing.

The participants discussed the need to research the cultural, educational, and social justice aspects as well as policies around promoting and supporting black women in computing.

Further, in a breakout survey response, a participant noted the importance of the K-12 setting, stating, “(We need) participation and prioritization of education, CS and teens. For example, how to get our kids even more thirsty and demanding of educational opportunities and quality.” This quote represents the need to look holistically through the K-12 and IHE pipeline, and researching how we could motivate and engage

students early in their educational career. While much of the discussion focused on university settings, some discussion focused on the pipeline with middle and high schools.

THEME 6: OUR VOICES- ILLUMINATING OUR TRIALS AND TRIUMPHS

Sharing and validating the experiences, both positive and negative, was a major value to the participants during the workshop. A participant noted, “Having that sisterly support was amazing. I learned something just talking and listening to people share their experiences.” The overall survey responses indicate the value of sharing their experiences, listening and relating to the trials, and feeling inspired by triumphs.

> *“Black Women in CS should not be represented as a minority group. We are a powerhouse in and of ourselves.”*

Discussions about shared experiences turned to exploring opportunities that show how diversity positively impacts innovation, creating and owning the message about black women in computing, and collecting anonymous stories and publishing them in a book.

THEME 7: BRANDING AND COMMUNICATION

Most of the participants were at university settings, with a couple of participants representing industry and government. As such, perspectives from industry were greatly valued at the workshop. The notion of improving the branding and communication of black women in computing was motivating and eye opening for participants. Many survey responses featured the issue of "branding" as one of the lessons learned during the workshop.

Branding and communication included discussions about how to "brand ourselves", how to capitalize social media and websites to improve visibility, and how to market a movement. During the whole group discussions, the participants strategized about building a black-women-in-computing logo, creating a group on LinkedIn, and disseminating a website that one of the participants had already created by the close of the workshop.

CONCLUSION

The two-day workshop included 24 black women in computing discussing three guiding questions:

1. Why don't interventions for women in computing work for black women in computing?
2. What are the implicit and explicit gender and stereotype bias for black women in computing?
3. What are tangible intervention/ support strategies for black women in computing?

The workshop included three small group breakout sessions and two whole group discussions. During the whole group discussions, the participants collectively identified seven salient themes as discussed in the report.

All participants were highly engaged during the two days. Data from the observations showed that every participant during the small breakout sessions made contributions to the discussion, and they were active listeners.

The survey results from the breakout sessions and post-workshop remained very consistent. Benefits that were most commonly cited by the participants include:

- Sharing their experiences in a safe and supportive environment,

- Affirming the intersectionality of race and gender, and owning the identity and role of black women in computing, and
- Collectively creating an action plan of solutions to promote black women in computing.

The survey results showed the value and importance of creating a safe, open, and supportive environment to talk about the experiences of black women in computing. “I am not alone!” mantra was common across the surveys. A respondent eloquently stated, “[It was a] safe space created by the organizers and facilitators that allowed the women to interact authentically”.

Affirming the intersectionality of race and gender in computing with others was particularly “refreshing”, “inspiring”, and “heartwarming.” As one respondent noted, “As black women, we have been integrating ourselves for far too long. The result is that sometimes we can lose our identity in the process. This was clear to me when we had some hesitation using black women instead of like-minded people when developing action items related to community.”

Collectively creating an action plan for and by black women in computing was highlighted by many respondents. A respondent stated the workshop was beneficial for “organizing a movement around black women in computing to fight against not being seen or heard.” Another respondent wrote that the workshop

"was very productive in that we were able to discuss pertinent issues and immediately translate them into action items".

Recommendations and Next Steps

The recommendations and next steps show the action plan by theme identified during the workshop. During the workshop, participants signed up to take the lead and created working groups focused on each theme with action items and next steps (often with timelines). As one participant noted, this is the first step in continuing to address and meet the needs of black women in computing.

> *"Before the workshop, I didn't know what to do about the lack of black women in computing. To me, it felt as though little had changed since I was a student. I learned that much can be done. Our list of action items is a first step."*

Theme 1: Linking black women in computing to the bottom line for accountability

- Conduct data collection at meetings/events/conferences, and existing data sources (Taulbee, NDS [Non-PhD granting institutions], WebCasper, etc.).
- Seek partnerships directly with primary data sources (e.g., similar to ABI's Women of Vision

awards and look at the metrics for the awards, which are publicly available).

- Create LinkedIn profile so that can we get to know who is out there, and become active members of the LinkedIn group.
- Create database or compilation of institutions where there are black women faculty, including institutions with a track record of graduating black women.
- Develop metrics for a database, i.e., data on completion rates, acceptance rates.
- Request that NSF disaggregate data for CS.

Theme 2: Developing key influencers and thought leaders

Action items:

- Put together list of people who can be academic and industry speakers (i.e., *Black Women in Computing Speakers Bureau*).
- Provide list of academic and industry speakers to GHC 2016 planning.
- Identify the black women in computing who are ***already*** entrepreneurs.
- Increase visibility in the nomination process for awards.
- Leverage research expertise to create clearinghouse for literature about black women in computing (i.e., writing white papers, which

include implications for black women in computing).

- Develop white paper and disseminable infographic that creates a spirit of urgency around the lack of *sustainable* diversity in computing, particularly with the current efforts toward coding. Policy impacts should be discussed (in white paper) concisely and clearly about computing ***for everyone***.
- Develop white paper that addresses current state of the art for black women in computing, that discusses social justice, for example.

Theme 3: Increased cultural and educational supports for black women in computing

Action items:

- Provide research that defines and describes these supports for black women.
- Develop repository/collection of research about cultural and educational supports for black women.
- Develop training that can support academic and corporate culture (e.g., provide training on unconscious bias). We may be able to partner with existing organizations that conduct this training.
- Write white paper that defines what we mean by *culture* for black women in computing.

Task 4: Leadership Development

Action items:

- Determine national board and committee participation that may be critical for career progression (e.g., committee for the National Academies, NAE, NAS, CRA Board, AAAS).
- Develop leadership development plan for black women in computing (i.e., help black women navigate their professional careers). (This effort is being led by senior black women in the community.)

Theme 5: Lack of collective research about black women in computing

Action items:

- Define the agenda (research questions) that are important for black women in computing.
- Consider applying for *Google Rise* (deadline: Feb 19th).
- Compile a list of social scientists with whom we can partner on research projects.
- Publish research in BPC venues (e.g. RESPECT, Special Issues in well-established journals such as ACM and IEEE).

Theme 6: Our voices: Illuminating our trials and triumphs

Action items:

- Provide an opportunity to show how diversity impacts innovation.
- Help control the messaging about black women in computing.
- Collect anonymous stories and publishing them online, and eventually, in an edited book volume.

Theme 7: Branding and communication

Actionable items:

- Produce a TED talk about black women in computing.
- Consider legality of partnerships, especially if we begin securing funds.

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APPENDIX A: AGENDA

AGENDA

Friday, January 8

5-6:30p	**Hotel Check-in / Registration**
6:30-8p	**Reception / Welcome Session** • *Lincoln, Jefferson*
	Workshop organizers, Participant introductions

Saturday, January 9

7:30-8:30a	**Sign-in & Breakfast** • *President's Quarters Foyer*
8:35-9:05a	**General Session** • *Lincoln*
9:10-10:25a	**Breakout I** • *Lincoln, Jefferson, Kennedy*
10:25-10:45a	*Break*
10:45a-Noon	**Breakout II** • *Lincoln, Jefferson, Kennedy*
Noon-1:30p	*Lunch, General Session* • *Lincoln*
	Special Keynote: Dr. Kelly Mack, AAC&U
	Synthesis of Breakout Sessions
1:30-2:45p	**Breakout III** • *Lincoln, Jefferson, Kennedy*
2:45-3p	*Break*
3-4:15p	**Breakout IV** •*Lincoln, Jefferson, Kennedy*
4:15-5:15p	*Break, Prep for General Session*
5:15-6:15p	**General Session** • *Lincoln*
6:15-7:15p	**Dinner** • *Lincoln*

Sunday, January 10

8-9a	**Breakfast** • *President's Quarters Foyer*
9-9:30a	**General Session** •*Lincoln*
9:30-10:45a	**Breakout V** • *Lincoln, Jefferson, Kennedy*
10:45-11a	*Break & Hotel Check-out*
11a-Noon	**Final General Session** • *Lincoln*
Noon	**Closing and Adjournment** • *Lincoln*
	Remarks
	Box Lunch

• *Meeting Location*

APPENDIX B: PARTICIPANTS

Figure 1: Workshop Attendees

List of Attendees

Jamika D. Burge serves as Director of Assessment Technology Product and Research for the Smarter Balanced at UCLA, and she also has an Adjunct Professor of Computer Science appointment at Howard University. She is active in computer science education and STEM preparedness efforts, providing expertise for a host of programs funded by the National Science Foundation (NSF) and the Computing Research Association (CRA) designed to broaden participation in computer science. Dr. Burge holds a PhD in CS from Virginia Tech, where she was an IBM Research Fellow.

Loretta Cheeks has developed systems & led development teams within the communications, radio, avionics, instrumentation & control and chemical industries. After spending 20 years engineering technical solutions for Fortune 500 corporations, she started the journey to earn a PhD in CS as an Adobe Foundation GEM Fellow at Arizona State University. In 2015, Cheeks also founded StrongTIES to promote STEM K-12 education that emphasizes creativity, problem-solving, collaboration and a sustainable education program using computer technologies.

Danielle Cummings is a Computer Systems Researcher for the Department of Defense. She is also the founder and committee chair of *Black Women in Computing* (BWiC), a community focused on increasing the number of black women and other minorities in computing-related fields. Dr. Cummings holds BA degrees in CS and Art from The Ohio State University, an MS in Software Engineering from the University of Houston, Clear Lake, and a PhD in CS from Texas A&M University.

Barbara Ericson is the Director of Computing Outreach for the Institute for Computing Education (ICE) for the College of Computing at Georgia Tech. She is trying to increase the quality and quantity of secondary computing students and the quantity and diversity of computing students. Ms. Ericson has BS and MS degrees in CS, and has worked in several research

labs, including General Motors Research Labs, Bell Communication Research, and The Institute for Paper Science and Technology.

Raquel L. Hill is an Associate Professor of Computer Science in the School of Informatics and Computing at Indiana University. Her primary research interests are in the areas of trust and security of distributed computing environments and data privacy with a specific interest in privacy protection mechanisms for medical-related social science datasets. Dr. Hill holds BS and MS degrees in CS from Georgia Tech and a PhD in CS from Harvard University.

Apriel K. Hodari is a Principal Investigator at Eureka Scientific, Inc., and serves as co-leader (with Maria Ong) of the Beyond the Double Bind projects, investigating the lived experiences of women of color in science, technology, engineering and mathematics (STEM). She is an expert in STEM education research, STEM educational equity and workforce diversity, and the culture of STEM disciplines. Her work appears in over 100 research and policy publications.

Mave Houston is Founder and Head of Capital One's USERLabs. She is most interested in learning about how people make sense of the world around them and how relationships among people impact social and economic change. Dr. Houston holds a BS in CS from Spelman College, and she earned her MS and PhD degrees in CS from Auburn University.

Thorna Humphries is an Associate Professor of Computer Science at Norfolk State University. Dr. Humphries' research interests lie in the discovery of principles and developmental technologies to support the management and representation of data. She received an MS in CS and EE from the Massachusetts Institute of Technology in Cambridge, Massachusetts, and a PhD in CS from the University of Colorado at Boulder, Colorado.

Sandra K. Johnson is the Founder and CEO of SKJ Visioneering, LLC, a global technology consulting firm. She is formerly the Chief Technology Officer (CTO) of IBM Central, East and West Africa, and was based in Nairobi, Kenya. She is an accomplished researcher, having earned numerous career accolades including membership in the IBM Academy of Technology and being named an IEEE Fellow and an ACM Distinguished Engineer. Dr. Johnson earned BS, MS, and PhD degrees, all in EE, from Southern University, Stanford University, and Rice University, respectively.

Elva Jones is a Professor of Computer Science and Department Chair at Winston-Salem State University. Her research interests include visualization, system design & development, human-computer interaction, and CS

education. Dr. Jones received her BS from Winston-Salem State University, her MS from the University of North Carolina at Greensboro, a second MS from North Carolina State University, and her PhD from North Carolina State University.

Andrea Lawrence is an Associate Professor and Chair of Computer Science at Spelman College. A member of the Spelman College faculty for 30 years, one of her main interests is increasing the number of minority students and women who pursue graduate degrees in CS. She has worked with the Computing Educators Oral History Project (CEOHP) and the History Makers, and she has been involved in a number of mentoring activities including the Academic Alliance of NCWIT and the STARS Alliance. Dr. Lawrence received her BS degree in Math from Purdue University and her PhD in CS from Georgia Tech.

Kelly Mack is the Vice President for Undergraduate STEM Education and Executive Director of Project Kaleidoscope, a non-profit organization focusing on undergraduate STEM education reform, at the Association of American Colleges and Universities (AAC&U). Prior to joining AAC&U, she was the Senior Program Director for the National Science Foundation (NSF) ADVANCE Program while on loan from the University of Maryland Eastern Shore (UMES) where, as a Professor of Biology, she taught courses in Physiology and Endocrinology for 17 years. Dr. Mack earned a BS in Biology from UMES and, later, a PhD from Howard University in Physiology.

Jane Margolis is a Senior Researcher at UCLA's Graduate School of Education and Information Studies. She is the lead author of two award-winning books about issues of equity in education and how fields become segregated and manifested in computer science education: Unlocking the Clubhouse: Women in Computing (MIT Press, 2002) and Stuck in the Shallow End: Education Race, and Computing (MIT Press, 2008). Dr. Margolis earned an MA in Psychology and an EdD in Education from Harvard University and Harvard University Extension, respectively.

Yolanda Rankin is an Assistant Professor of Computer Science at Spelman College. Her research involves three primary research areas, including leveraging social interactions in video games to facilitate language learning; game design as an effective pedagogical strategy for in-creasing the number of African Americans in the CS pipeline; and participatory design of mobile-based health care services that target underserved populations (e.g., women of African descent). Dr. Rankin holds a PhD in CS from Northwestern University.

Rosario Robinson is a Senior Manager for Community Engagement and Development for the Anita Borg Institute (ABI). She is the Diversity Officer, managing all ABI sub-communities to include Underrepresented Women in

Computing, Latinas in Computing, Black Women in Computing, LGBT, Turkish Women in Computing and Arab Women in Computing. Ms. Robinson holds an MSc in Math and Computer Information Systems from Georgia State University.

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APPENDIX C: METHODOLOGY

Evaluation Methods

The purpose of the evaluation was to provide formative and summative information about the workshop. The formative evaluation included observation data from breakout sessions that the facilitators and organizers used during the workshop to ensure all participants were engaged in discussion. The summative evaluation included documenting the themes and main discussion points during the two-day workshop, synthesizing feedback from participants, and offering action items for future work.

We utilized a multi-method approach to the evaluation. We collected both qualitative data, such as observations, document review, and notes, and quantitative data, such as surveys. A distinguishing feature of this evaluation is the data collected from various sources, including data from the evaluator via observations, data from facilitators via field notes, and data from the participants via surveys.

Data Sources

To document the discussions and themes during the two-day conference, we collected multiple sources of data, including:

1) Facilitator notes,
2) Observations,
3) Breakout session surveys,
4) Post-workshop surveys, and
5) Documents.

Data Source	Respondent	Data Type
Facilitator Notes	Facilitator	During each breakout session, each facilitator took notes of themes, discussion, and next steps.
Observations	Evaluator	The evaluator followed an observation protocol and observed each breakout session for 10-20 minutes.
Breakout session surveys	Participants	After each breakout session, participants completed a quick open-ended survey.
Post-workshop surveys	Participants	One week after the workshop, participants were invited to complete a post-workshop survey.
Documents	Participants	Group power point slide, flip charts during the workshop

Facilitator notes. The evaluator created a facilitator's guide for each guiding question and breakout session. Within the facilitator guide, there were open spaces for the facilitator to take notes of the discussion, themes, challenges, and next steps. The evaluator reviewed the guide with the facilitators prior to the workshop. Each facilitator took notes electronically, or by paper-and-pencil. The unit of analysis is the group level, where each breakout session had between 6-9 people.

Observations. The evaluator created a protocol prior to the workshop. During the workshop, the evaluator observed each breakout session for 10-20 minutes. The evaluator took detailed notes of the group interaction, key themes and discussion, and number of participants. After each breakout session, the evaluator met with the facilitators to discuss the group dynamics to ensure that all participants are engaged and actively taking part in the conversation. Changes and adjustments were made accordingly based on the data from the observations, such as creating a whole group session. The unit of analysis is the group level, where the observations were of the small group interactions during each breakout session.

Breakout session surveys. The breakout session surveys included three open-ended questions:

1) During the breakout session, what factors or experiences were the most relevant to your own experience?

2) What additional factors or experiences would you add to inform the breakout session discussion?
3) What recommendations would you have for future workshops in this topic/ guiding question?

During breakout session 1, surveys were administered to two out of three groups. The overall response rate was 60% (12/20), or 86% (12/14) as the adjusted response rate that reflects the two groups that were given the survey. In breakout session 2, the response rate was 90% (18/20), and breakout session 3, the response rate was 90% (18/20). The unit of analysis is the individual level.

Post-workshop surveys. The post-workshop surveys included four open-ended questions:

1) List the top three things you learned during the workshop.
2) What was the most useful or valuable aspect of the workshop?
3) What was the least useful or valuable aspect of the workshop?
4) How can we improve the workshops in the future?

One week after the workshop, the questions were administered via on-line survey to all participants. Two email reminders were sent. The response rate was 50% (12/24). The unit of analysis is the individual level.

Documents. During the two-day workshop, participants used flipchart paper during breakout sessions, during whole group meetings, and power point slides. The unit of analysis is the group level.

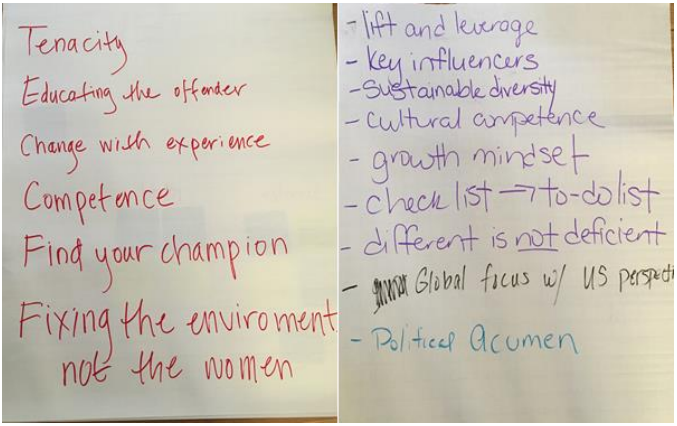


Figure 2: Flip charts during workshop

Taken together, the data sources include data at the group and individual level, from different sources (e.g. evaluators, participants, and facilitators), and qualitative and quantitative data.

Data Analysis

During the workshop, seven themes were identified after three breakout sessions. A whole group discussion included next steps for each theme. Within each theme, data from the various sources were used to:

- Identify the main issues, concerns, and challenges,

- Share best practices, solutions, and successes, and
- Create action plans.

The evaluator conducted thematic analysis from the qualitative data, including the observations, documents, field notes, and video narratives. The evaluator triangulated the results with the survey, using the survey to further verify the themes.

APPENDIX D: DATA COLLECTION MATERIALS

BWiC Breakout Session Facilitator's Guide

Facilitator's Guide Format

The breakout sessions are small group (no more than 8 people) discussions around a guiding question about black women in computing. The role of the facilitator is to guide (and sometimes cajole) a discussion to identify factors, barriers, and experiences related to each guiding question. Facilitator responsibilities include: 1) Intervene if discussions start to fragment, 2) Identify and intervene if needed, 3) Prevent dominance and include everyone, 4) Summarize discussions and conversations, and 5) Bring to closure the meeting with end result or action.

As a facilitator, establish your breakout session's **ground rules** for how we share and what we produce as a result of our meeting. This is the beginning of a community/network that might benefit from an organized foundation.

- Ask: What should the ground rules be?
- Examples might be…
    - *Listen to another's comments before responding.*
    - *All shared comments and experiences are deemed personal and should not be repeated outside of this meeting*.

As a facilitator, think about how to **jump-start stalled discussion**, such as:

- Summarize discussion and themes discussed thus far
- Ask if there are data to support various themes
- Ask people to write down their most important points, and then discuss as group

As a facilitator, think about how to **prevent dominance**, such as:

- As for comments only from those who have not spoken yet
- Ask participants to bring up new topics (other than the dominator)
- Instead of brainstorming as a group, ask individuals to write down ideas and then go round-robin
- State someone has “the mike” or “the floor” so that everyone focuses attention on the person with the “the mike” or who has “the floor”.

The **general agenda** for each breakout session is as follows:

I. Introduction
II. Guiding question
III. Round robin discussion and brainstorming
IV. Summarize and synthesize

During the session, as facilitator, please also take notes, which are imbedded in this guide. Notes needed to evaluate the workshop include documenting number of attendees and summary of discussion.

Under each agenda item, there is a sample script, tips for the facilitator, and a note-taking box. Please use this as a guide to help as you facilitate an engaging conversation!

I. Introduction

Sample script: Welcome to this breakout session! I'm <state name>, and I'll be facilitating this session. During the next hour, we'll discuss the guiding question for this session and brainstorm the factors and experiences that relate to the topic. At the end of our session, we should have a list of factors associated with the issue, possible solutions to the issue, and addition topics for future workshops. Before we begin, let's introduce ourselves.

Let's introduce ourselves with our name, our current position/ what we do, and how we are connected to this topic of Black Women in Computing. I'll start.

Facilitator tip: Guide each participant to introduce themselves. As they introduce, write their names and position below.

II. Guiding Questions for Breakout Session 1 & 2: Why don't interventions for women in computing work for black women in computing?

Sample script: The guiding question for this session is "**Why don't interventions for women in computing work for black women in computing?**" You'll have an opportunity to continue talking about this through Breakout Session 2. Examples related to the guiding question include:

- What are current interventions/supports available for black women, specifically, as part of women in computing outreach (such as at GHC, NCWIT, AWC, NSBE, etc.)?
- What are reasons that these interventions/supports are not as impactful?
- How are black women's experiences at GHC different from other women's experiences at GHC?
- How are black women's experiences at *any* technical conference different from other women's experiences at such conferences?
- Are there any existing strategies in place that work and should be replicated?

- What are any barriers to existing strategies, or barriers to make interventions work?

Facilitator tip: You might want to unpack the guiding questions into factors, barriers and experiences, or other ways to focus the upcoming discussion on the topic area (e.g. structural, political, educational, personal factors).

III. Round Robin Discussion and Brainstorming

Sample script: We'll be talking about this guiding question, and talk about factors, barriers, and our experiences. I want to make sure I can capture our discussion so you'll see me taking notes.

Facilitator tip: Review ground rules. Decide how you want to structure your brainstorming session… Free Form? Use of Affinity Process? Use of Consensus Process?

- **Free Form Process.** People just talk and discuss. Facilitator monitors, participates in discussion, takes notes.
- **Affinity Process.** Each person writes down response on card or sticky-note. Group walks around and silently groups and re-groups into

themes. Group creates concise headers for each group (often done silently as group goes to board and starts putting headers). Once done, facilitator then opens discussion—What are the headers telling us? What is suggested?

- **Consensus Process.** Post single open-ended question (guiding question). Brainstorm in layers (start with silent individual brainstorming, then share in small group/pairs writing one idea per card). Facilitator calls each small group/pair to share one card at a time, going round robin, and clusters ideas as a whole group. Facilitator helps the group name clusters once all cards are on the wall. Facilitator confirms and resolves that the ideas represent the consensus of the whole group.

IV. Summarize and Synthesize

Sample script: This is great work, now let's summarize our discussion. <Review themes from your notes above>. Did we miss anything? Were there other things you wanted to add before we adjourn? Thanks for your time and thoughts. If you could also fill out this short survey, it'll help us document your thoughts and suggestions.

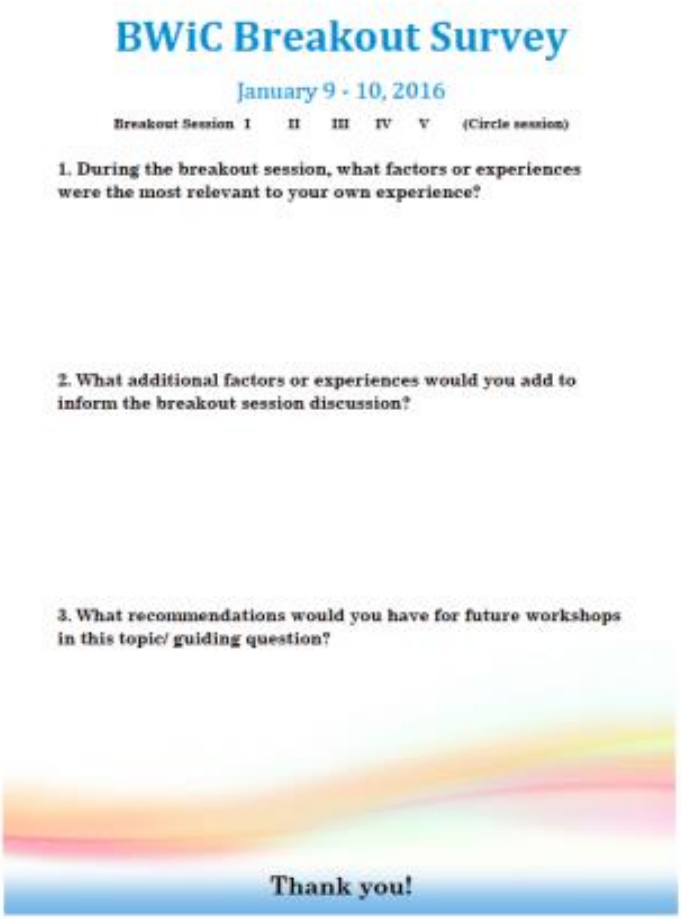
Facilitator tip: The post-session survey should be 5 minutes. So keep time so you can make sure you give enough time for people to quickly write down their answers in the survey.

Observation Protocol

BWiC Workshop: Observation Protocol
Breakout Session #1

	Group 1	Group 2	Group 3
Observation Time (Start/End: Total Min)			
Facilitator			
# Participants			
# Other observers			
Quantity of discussion (Mark # talk per participant)			
Quality of discussion (Mark themes/ discussion points)			
Notes			

Breakout Session Survey



BWiC Breakout Survey

January 9 - 10, 2016

Breakout Session I II III IV V (Circle session)

1. During the breakout session, what factors or experiences were the most relevant to your own experience?

2. What additional factors or experiences would you add to inform the breakout session discussion?

3. What recommendations would you have for future workshops in this topic/ guiding question?

Thank you!

Post-Workshop Survey

BWiC Post-Workshop Survey

January 10, 2016

1. List the top three things you learned during the workshop.

2. What was the most useful or valuable aspect of the workshop?

3. What was the least useful or valuable aspect of the workshop?

4. How can we improve the workshops in the future?

Thank you!