Follow-Up Workshop:

BLACK WOMEN IN COMPUTING: A   RESEARCH AGENDA

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

Final Conference Report

February 2017

Follow-Up Workshop

Computing and Intersectionality:

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

Final Conference Report

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EXECUTIVE SUMMARY

In January 2017, the inaugural Black Women in Computing (BWiC) conference was held at Howard University, in Washington DC. The two-day conference included 80 participants, where most of the participants were black women students or professionals in computing. Participants included graduate students, CS professors, business leaders, social scientists, and professionals in private industry. Across the two days, the conference included distinguished keynote speakers, facilitated panel sessions, and breakout discussion groups. Ample time was provided throughout the conference for open networking sessions. During a breakout session, the participants discussed the following 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 biases for black women in computing?
3. What are tangible intervention / support strategies for black women in computing?

Through these questions, the participants discussed themes that were identified in a prior workshop of 24 black women in computing (January 2016), providing further validation of the salient themes surrounding black women in computing. Data from facilitator notes, participant surveys (pre-conference, breakout session, and post-conference surveys), and conference artifacts were used to verify the themes. In all, salient themes were validated, utilizing data from about 100 black women in computing.

The themes identified were validated by a larger group of black women in computing. Other factors were also discussed. Similar to past research (Ong et al, 2011), there were inter-related factors across pathways to promote black women in computing. The first is in the area of K-12 education. Several survey responses indicated the need to start early with a focus on girls and undergraduate students. Many participants also reflected on their own resiliency and identified best practices and themes in K-12 settings. A consistent narrative included parent support and influence, early connections with mentors and role models (that carried throughout), and academic readiness (often in accelerated tracks in math courses in middle and high school).

In the area of the college/university experience in undergraduate or graduate levels, participants discussed the critical importance of creating a support system, seeking multiple mentors and role models, and the necessity of financial support. In addition, participants echoed the need to thoroughly know the materials and remain persistent.

In the area of employment and beyond the formal schooling phase, the seven themes identified at the first BWiC workshop was validated with the need to develop leadership, influencers, and thought leaders, illuminate and share experiences, and spread the community through branding and communication. Participants from both the private section and the academy noted the need to hold organizations accountable to promote not just "underrepresented minorities", but black women specifically. Figure 1 shows the cross-section of the major themes that describe the overall intersectionality of race and gender for black women in computing.

Figure 1. Intersectionality of Race and Gender in Computing

Pathways through the Intersectionality of Race and Gender in Computing

Taken together, data from the 80 participants during the 2017 BWiC conference was consistent with the data from the 24 participants during the 2016 BWiC workshop. Some themes were refined during the analysis process, with the final themes of the intersectionality of gender and race in computing resulting in the following:

- Linking black women in computing to the bottom line for accountability
- Developing leadership throughout the pipeline
- Increased cultural and educational supports for black women in computing
- Lack of collective research about black women in computing
- Our voices: Illuminating our trials and triumphs
- Branding and communication

In all, it is important to note that throughout the conference, the identity of the black women in computing expanded. There were not only computer scientists, they were entrepreneurs, mentors, leaders, advocates, technologists, and above all, innovators.

INTRODUCTION

The excitement and value of computer science is palpable, from K-12, higher education, to the workplace. In a recent Glassdoor study (Berry, 2016), eight of the ten most profitable majors is tied to science and engineering. Upon graduation, science and engineering majors earn the highest median salary for entry-level positions, with computer science as the top earning entry-level job.[1] From analyzing more than 500,000 resumes and self-reported salaries, entry-level salary of computer scientists is $70,000, with popular entry-level jobs as software engineers, systems engineer, and web developer.

With such promise of career benefits, it is no wonder that computer science is becoming a popular topic and area of study. Many states, districts, and federal initiatives are promoting computer science at an earlier age. In particular, the *CS for All* initiative under the Obama administration (White House, 2016) called important attention to the need to make computer science education and opportunities more inclusive.

One regional example is the announcement in New York City of Computer Science For All New York City Students (CSNYC), a ten-year initiative to scale computer science education to 1.1 million students in New York City's public schools. The goal is for each student in New York public school to receive at least one meaningful, high-quality CS learning experience at the elementary, middle, and high school levels.[2]

At the federal level, the Computer Science for All initiative calls computer science a "new basic" skill necessary for economic opportunity and social mobility[3]. The initiative calls for funding in computer science through the National Science Foundation and the Corporation for National and Community Service, funding to states and local districts to expand K-12 CS, and involving state and corporate leaders to commit to CS.

This invigoration of computer science at all levels of policy, education, and the workplace provides an opportunity to understand the current state of computer science, and how to promote an environment that is inclusive to all students.

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[1] See Glassdoor study: https://www.glassdoor.com/blog/50-highest-paying-college-majors/

[2] Information about CSNYC at: https://csnyc.org/our-work/cs4all

[3] Information about the White House CS for All Initiative at: https://www.whitehouse.gov/blog/2016/01/30/computer-science-all

Context

From 1994-2012, the percentage of black women entering college has risen from 48%-62% (Lopez & Gonzalez-Barrerra, 2014). At the same time, interest in STEM is growing (National Science Board, 2014, 2016), where almost half of first-year undergraduate students (45%) intend on majoring in the STEM field. Among the 45% of freshmen indicating interest in majoring in STEM, 11% are interested in computer science, mathematics, or statistics. The majority of students interested in STEM is interested in engineering (31%), biological sciences (32%), and social sciences (21%). Physical science is the lowest at 6%.

Though it is expected that fewer individuals actually pursue a terminal degree in CS, it is clear that at every point in the post-secondary ecosystem, the number of black graduates in particular are severely underrepresented (Margolis, 2008; National Science Board, 2014, 2016; Zweben, 2013).

Drilling down to the race/ethnicity breakdown of the mathematics and computer science majors, Figure 2 shows the freshmen intent to major in mathematics and computer science from 1998 to 2014. For blacks/African Americans, the peak was in 1998 at around 17% with the trend getting lower each year, to a low of 9% in 2014. For Asians and Hispanics, while the overall interest is low, the trend is increasing over the years to about 20% in 2014. The trend in interest is very illuminating where interest in mathematics/CS is decreasing for black students across 17 year span, while it is increasing for Asians and Hispanics.

Figure 2: Freshman intent to major in mathematics/CS
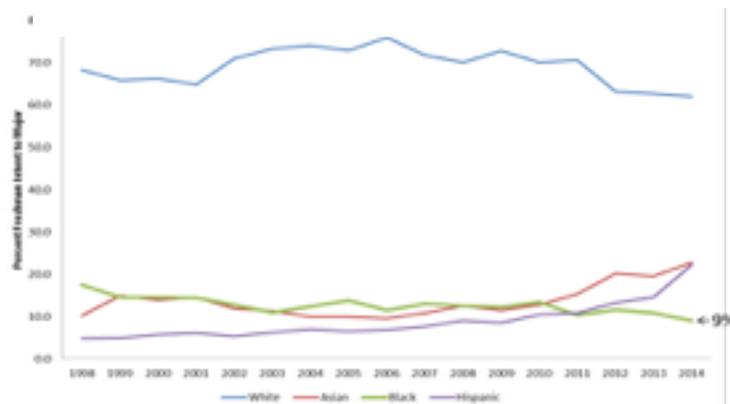
In 2014, only 6,512 African American students graduated in mathematics or computer science with a bachelor's degree (Figure 3). The numbers of graduates are similar for African American, Asian, and Hispanic students since 2010.

Figure 3: Earned bachelor's degree in mathematics/CS
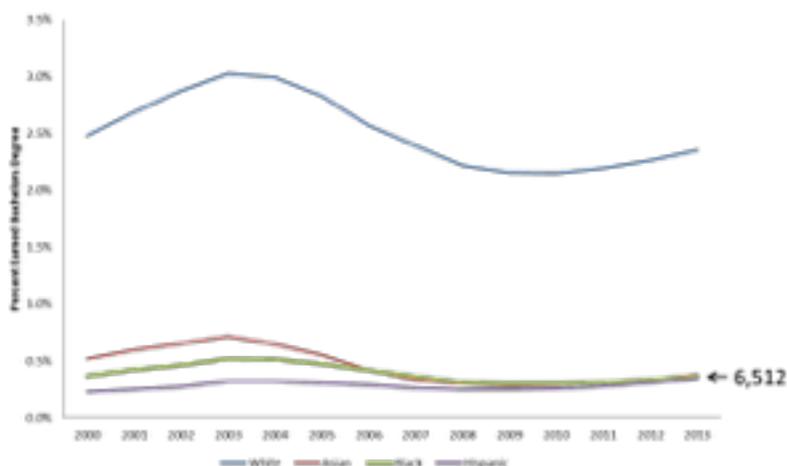
blacks earning a master's degree in mathematics or computer science are low, with 1,983 students graduating and earning a masters degree in 2014 (See Figure 4). At the doctoral level, black students earning a mathematics or computer science degree have remained relatively stable from 2000 through 2014, with fewer than 100 students graduating with a doctorate degree. In 2014, only 79 African Americans graduated with a doctorate in mathematics or computer science (See Figure 5).

Figure 4: Earned master's degree in mathematics/CS
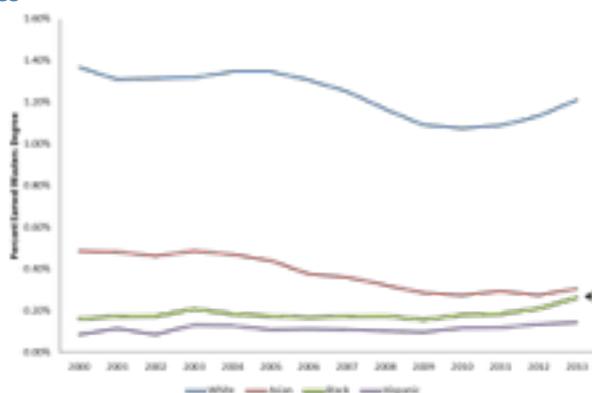
Figure 5: Earned doctorate degree in mathematics/CS
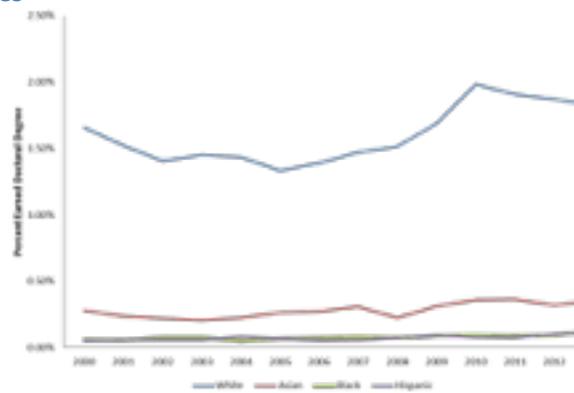
The numbers and percentages are significantly even lower for black women through this education pipeline (Casey, 2012; National Science Board, 2014, 2016; National Science Foundation & National Center for Science and Engineering Statistics, 2013). Moreover, black women tenure-track professors remain significantly underrepresented in STEM disciplines (Rankins, Rankins, & Inness, 2014). With respect to black women as underrepresented minorities in CS, the most recent data reveal that in the US, 3.6% of undergraduate, 1.6% of master's, and 1.2% of doctoral degrees were conferred to black graduates (Zweben, 2013).

For decades, the data have shown a stable trend of very little diversity in computing. There are countless of 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 edu-

cation improving for minority students. 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, researchers have looked at barriers to pursing CS among women and among students of color (Hill, Corbett, & St. Rose, 2010; Espinosa, 2011; Ross & Godwin, 2015; Zarett & Malanchuk, 2005). However, there is a scarcity of literature that focuses on the intersectionality of gender and race (Cantor, Mack, McDermott, & Taylor, 2014; Ong, Wright, Espinosa, & Orfield, 2011) and explores the experiences of black girls and women in the CS pipeline.

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 – other 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 (Malcom, Hall, & Brown, 1975; Malcom & Malcom, 2011). Within the computing community, awareness about black women's experiences is closeted. As the computing education 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 not only described as a social justice issue, but also promoted as a necessity to improve innovations in industry (National Science Foundation & National Center for Science and Engineering Statistics, 2013). 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 Conference

The Black Women in Computing Conference is an opportunity to discuss, advance, and celebrate the intersectionality of race and gender in computing. The conference goals included:

- Creating new networks and catalyze the community of black women in computing
- Developing skills in leadership, communication, wellness, and career development
- Discussing salient themes in the intersection of race and gender in computing

In addition, a research goal was to validate themes developed in a pilot Black Women in Computing workshop in January 2016 (Burge, Thomas, & Yamaguchi, 2016). During this workshop in 2016, 24 black women in computing convened to discuss salient themes of the intersectionality of race and gender in computing. This conference was an opportunity to validate the themes identified with a larger sample size.

This final report features the results from the conference, and features validated themes of the experience of black women in computing. A seminal feature of this report is the data, narratives, and validated themes from 24 black women in computing from the pilot workshop in 2016, as well as the 80 black women in computing from this conference in 2017. In total, this report features narratives and validated themes from almost 100 black women in computing.

To highlight the experiences of the women at the conference, this report features pullout text boxes (in blue text). These are quotes from the black women in computing through surveys from the conference. These quotes are used to highlight the importance of the conference and provide context for the validated themes.

CONFERENCE DESCRIPTION

The Black Women in Computing (BWiC) Conference was held at the Howard University campus in Washington DC from January 6 through January 8th, 2017. In addition to the National Science Foundation, additional corporate and organizational sponsorship was provided by Capital One, ACM-W, Anita Borg Institute, and NCWIT. The conference offered a scholarship to twenty graduate students that waived the registration fee and provided financial support for travel.

I've never had a conference so hyper focused on me. I've been to conferences that serve parts of my soul (my discipline, my gender, my race, my interests) but nothing that includes it all.

The theme of the conference was *Honoring the Past, Celebrating the Present, and Looking to our Future*. This theme represented our intentional among the conference organizers to include a mix of graduate students, professionals in computing, and "grand dames" of computing.

I love, love, love, love, love that I could be unapologetically black.

Across the three days, the conference included distinguished keynote speakers, facilitated panel sessions, and breakout discussions. Ample time was provided throughout the conference for open networking sessions. (See Appendix A and B for the conference agenda and keynote speakers.)

There were 80 conference participants. Among the 80 participants, 13% were scholarship students (from Ph.D. programs), and 14% were participants in the BWiC pilot workshop in 2016 (see Figure 6). Almost three-quarters of the attendees were first-time conference participants. Close to 100% of the participants were black women, and the majority of women were in the computing field (e.g. computer science, computer engineering, information technology, cybersecurity, etc.).

In the pre-conference survey, all respondents (N = 35) reported that the importance of this conference included the ability to network, share in the community, support one another, and seek mentorship.

Figure 6: Conference participants
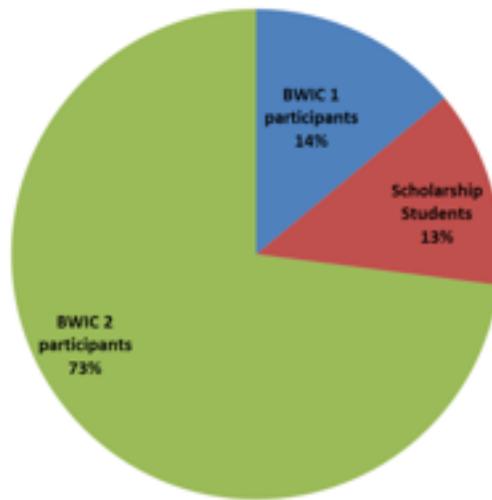
INTERSECTIONALITY OF RACE AND GENDER IN COMPUTING: VALIDATION OF THEMES

The themes developed during the Black Women in Computing (BWiC) workshop in 2016 included the following:

- 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

In validating these themes from the first BWiC workshop, facilitators (CS researchers) led a small group discussion during a breakout session to discuss these seven themes to validate and explore these themes further. Five small groups consisting of 11-15 participants discussed the themes and their own reflections of the intersectionality of race and gender. After the small group discussions, each group reported their findings and discussions to the whole group for a larger set of discussions. During the larger group discussion, the goal was to further synthesize themes and narratives. In addition to the facilitated small group discussions, data from this conference included several surveys (pre-conference, breakout session, and post-conference surveys), facilitator notes, evaluator observations, and whole group discussion notes (See Appendix C for evaluation methodology, and Appendix D for data collection materials). Full results of the surveys are presented in Appendix E. Taken together, these themes represent the collective narratives of about 100 black women in computing (24 from the 2016 BWiC workshop, and 80 from the 2017 BWiC conference).

One refinement to the seven themes given the data from the 80 participants from the BWiC conference is in combining the theme of developing key influencers and thought leaders (Theme 2) with the theme on leadership development (Theme 4). Rather than 7 separate themes, the validation process included this refinement of combing these themes into a broader theme of leadership. Specific information about each theme is discussed below.

Linking black women in computing to the bottom line for accountability

One of the conference speakers (Michael angela Davis) emphasized the importance and buying power of the black woman, noting that as consumers, black women are loyal brand consumers. As voters and advocates, black women are politically aware and involved in their communities. As black women in computing, participants talked about various programs, from Black Girls Code for kids, MIT MITES for high school students, Grace Hopper Conference for researchers, and funders such as NSF to "broaden participation" in computer science. These discussions led to the fact that there were more percentages of women and blacks in computing, especially in industry, decades ago. In fact, the trend data from NSF (2016) shows a clear decline in CS interest since 1998.

During the conference, I learned that Black women are a catalyst in society.

As with the first BWiC workshop, the emphasis on holding universities, colleges, and employers accountable for increasing a diverse group of students, faculty, and employees is needed. This "bottom line" to increase the numbers of black women in computing was echoed throughout the conference. One graduate student noted that while she attends an HBCU, all her computer science professors are black men. There are no black women in computing at her HBCU. Her mentor is a black woman professor [sic] in the engineering department, but not in computer science.

It is horrible that percentages of women and blacks in computing are significantly lower than they were 30 years ago.

In line with this theme of accountability, participants noted the need for data on what works —what interventions seem to work to keep black girls and women in computing, what organizations seem to be pro-active in retaining black women in computing, and what institutional structures work at universities and colleges to promote and graduate black women in computing.

While organizations should be held accountable to hiring, retaining, and promoting black women in computing, the participants also noted the importance of "being the best" at what you do. In essence, there is just as much importance to hold oneself accountable by having a solid mastery of computer science, engineering, or IT (e.g. content knowledge). This mastery starts early with K-12 classes (e.g., accelerated or advanced math classes) onto their experience in undergraduate and graduate school (e.g., being part of group work).

As such, accountability and "bottom line" were discussed both as an organizational responsibility, but also as a personal drive to be viewed as a leader in computer science.

Developing leadership throughout the pipeline

In the first BWiC workshop, there were two themes related to leadership. The first was to develop key influencers and thought leaders by "getting a seat at the table" and "being prepared to take action once you get there." The second theme was on leadership development, where participants noted the importance of learning and acquiring leadership skills.

During the BWiC conference, these two themes intermingled to describe the prominent and consistent issue was of leadership through the pipeline—from graduate students learning leadership skills to self-advocate and learn to become a thought leader, to senior-level "grand dames" helping to promote more thought leaders in the field. The issue of leadership, therefore, is its own pathway from acquiring and practicing leadership skills to developing key influencers and thought leaders. Examples and strategies, particularly in the academic circle, that were greatly discussed at the conference included:

It is simple. We do good work and distribute it widely. We must amplify each other.

- Providing peer reviews and supports to help researchers with their conference presentations and publications,
- Advocating for other black women in computing during funding opportunities and proposal reviews, and
- Identifying and promoting black women in computing for leadership positions at professional organizations, conferences, and open positions at institutions.

Increased cultural and educational supports for black women in computing

In the first BWiC workshop, almost all the participants were black women in computing with a doctorate in computer science, well into their careers in academe. As such, supports for black women in computing related to mostly the academic environment, from having sponsorship, advocacy, and mentors, to taking part in affinity and community groups. At the 2017 BWiC conference, participants included current graduate students, as well as black women in industry. The theme of needing increased cultural and educational supports were verified as an important factor, but also introduced the need to reach black girls and undergraduate young women. From K-12 supports to continued mentorship through undergraduate studies, participants echoed the theme of needing increased cultural and educational supports, but the focus was on the full pathway of black girls and women.

This conference also emphasized self-care, including mental health, as an important support for black women in computing. One of the keynotes (Dr. Fay Cobb Payton) shared her research on health disparities to her keynote talk emphasizing the need for black women to also take care of our mental health, several participants noted

Mental health is constantly being mentioned and I believe that a sister session can be worthwhile. This conference was naturally seen as a safe space so to have intelligent black women discuss their trials and develop collective solutions can benefit this network.

in surveys that the focus on mental health was necessary and important. Therefore, cultural supports included the exigent need to also focus on mental (as well as physical) health.

Lack of collective research about black women in computing

In the first BWiC workshop, the participants discussed the importance and the need for more research about black women in computing, given the lack of data and research. But, 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. This was echoed among the 80 participants at the BWiC conference, including an open topic session entitled, "Perceptions about research focused on black women and girls in computing".

Throughout the conference, participants talked about "FUBU"— for us, by us. Thus, there was a momentum of thought building at the conference of not being "test subjects", and instead, being part of research projects to study black women in computing. This led to the need for increased collaborations with social scientists to help form inter-disciplinary research projects.

Survey responses indicated the need for more data to determine "what works" (e.g., evaluations to study impacts of programs), basic research to understand the population of black women in computing, ways to collaborate to conduct collaborative projects, and a more in-depth look at what makes the experience of black women in computing different from other underrepresented minorities in computing.

In the conference feedback, several participants recommended creating a book or journal article about the collective narratives of the black woman in computing experience. In a similar

vein, one participant noted the need to create a database to collect the narratives of black women in computing. One participant noted a "survival guide" for black women in computing as another idea for a publication.

Our voices: Illuminating our trials and triumphs

A major benefit and theme identified in the first BWiC workshop was sharing and validating the experiences, both positive and negative, of being a black woman in computing. This remained the most significant benefit for the 80 participants at the conference. The post-conference survey revealed that almost all the respondents noted a benefit and value of the conference was illuminating the shared narrative of being a black woman in computing.

The ability to be surrounded by others who know the good and the bad, and know it as intensely as I do, is a rarity that I know will give me strength to go back to my day-to-day that I wouldn't be able to get elsewhere.

This theme is related to the need to create community and networks, to create a "sanctuary" to share the trials and tribulations of the computing field, and to celebrate the collective successes.

Branding and communication

During the first BWiC workshop, the issue of "branding" was one of the lessons learned during the convening. 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. This theme was reiterated across the two-days of the conference as well, particularly on the last day when discussions turned to next steps and action items. From trademarks to "Pantsuit Nation", participants eagerly discussed ways to grow the conference, community, and advocacy. Branding and communication was a means to be visible, vocal, and grow the community.

(I recommend) being visible and vocal about what is going on in our community so we can lift up and encourage each other.

Communication was a major theme in the post-conference survey results, with several participants wanting ways to continue to conversations and connections after the conference. Several participants noted the need to have a list of participants and contact information for distribution. Other participants noted the desire to keep the communication going as an on-line forum.

In the post-conference surveys, a couple of participants also noted the desire to learn more about how to get involved and learn more about local advocacy and politics. The intent of this was to be able to effectively promote black women in computing in the larger community dialogue.

CONCLUSION

The two-day conference included 80 participants, where almost all of the participants were black women in computing. Participants included graduate students, professors of CS, business leaders, social scientists, and computer scientists in private industry. During a breakout session, the participants discussed the following 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?

Through these questions, the participants discussed themes that were identified in a prior workshop, providing further validation of the salient themes surrounding black women in computing. Data from facilitator notes, participant surveys (pre-conference, breakout session, and post-conference surveys), and conference artifacts were used to verify the themes (Strauss & Corbin, 1990).

The themes identified were validated by a larger group of black women in computing. Other factors were also discussed. The summary of best practices and themes is shown in Figure 6. Similar to past research (Ong et al, 2011), there were inter-related factors across pathways to promote black women in computing. The first is in the area of K-12 education. Several survey responses indicated the need to start early with a focus on girls and undergraduate students. Many participants also reflected on their own resiliency and identified best practices and themes in K-12 settings. A consistent narrative included parent support and influence, early connections with mentors and role models (that carried throughout), and academic readiness (often in accelerated tracks in math courses in middle and high school).

I learned that I am not alone, and there is a support system of Black women just like myself. I felt motivated and encouraged to continue pursing my degree.

Pathways through the Intersectionality of Race and Gender in Computing

In the area of the college/university experience in undergraduate or graduate levels, participants discussed the critical importance of creating a support system, seeking multiple mentors and role models, and the necessity of financial support. In addition, participants echoed the need to thoroughly know the materials and remain persistent.

In the area of employment and beyond the formal schooling phase, the seven themes identified at the first BWiC workshop was validated with the need to develop leadership, influencers, and thought leaders, illuminate and share experiences, and spread the community through branding and communication. Participants from both the private sector and the academy noted the need to hold organizations accountable to promote not just "underrepresented minorities", but black women.

Taken together, data from the 80 participants during the 2017 BWiC conference was consistent with the data from the 24 participants during the 2016 BWiC workshop. Some themes were refined during the analysis process, with the final themes of the intersectionality of gender and race in computing resulting in the following:

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- Our voices: Illuminating our trials and triumphs
- Branding and communication

In all, it is important to note that throughout the conference, the identity of the black women in computing expanded. There were not only computer scientists, they were entrepreneurs, mentors, leaders, advocates, technologists, and above all, innovators.

Moving Forward

The conference provided a necessary space to affirm the intersectionality of race and gender in computing. Benefits that were most commonly cited by the participants include:

- Networking and supporting one another in a safe environment;
- Taking part in the black women in computing community (the feeling of "I am not alone");
- Focus on self-care;
- Leadership development and discussions of entrepreneurial skills; and
- Promoting and advocating for the black women in computing pipeline.

The survey results showed the value and importance of networking among black women in computing. This was a common reason for coming to the conference, and continued to be mentioned as a benefit throughout the conference. In addition to networking opportunities, taking part in this community, creating a safe, open, and supportive environment to talk about the experiences of black women in computing, participants often stated: "I am not alone!"

I would love to have a serious workshop in which members from "others" (Asian, White, female/male, Black panelists) will share their experiences and talk about intersectionality between race, gender, diversity, inclusion, etc.

In moving forward, the issues raised in the post-conference surveys were around how to broaden participation and expand the conference while keep the intimate feel of making meaningful connections with others. In addition, several participants noted the tension between having a communal BWiC space while needing to also have larger conversations around intersectionality in computing, including discussions about how to identify allies. The most commonly cited suggestions for future conferences and convenings included:

- Involving more representation from different sectors (employers, industry, etc.), where participants noted that participants from the academy dominated the conference;

- Making the conference longer, where participants noted that they would have liked to more time during the conference to discuss, and spreading out the activities so that most of the activities were bundled in one day;

- Creating a formal and structured networking opportunity for participants on the first day, where the concept of "speed dating" was mentioned by several participants; and

- Having an opportunity to create something together at the conference, such as clear action items and take-aways, draft paper or conference submissions, collaboration and project ideas, and events that benefit the community (e.g., a hackathon).

APPENDIX A: AGENDA

Friday, January 6th, 2017 – WELCOMING

5:45 – 6:45 p.m.	Reception
7:00 – 8:00 p.m.	Welcome & Orientation

Saturday, January 7th, 2017 – INSPIRING

7:30 – 8:30 p.m.	Breakfast
8:30 – 9:30 a.m.	Opening Session Dr. Jamika D. Burge, Capital One / Design & Technology Concepts, LLC Dr. Kamau Bobb, NSF Dr. Jakita O. Thomas, Auburn University
9:30 – 10:30 a.m.	Morning Keynote: Michaela angela Davis
10:30 – 11:00 a.m.	Break
11:00 – 12:00 p.m.	Morning Panel: Our Voices: A Discussion About Careers and Leadership Moderator: Dr. Quincy Brown, AAAS Panelists: Dr. Elva Jones, Winston-Salem State University Avis Yates Rivers, Technology Concepts Group International Dorcie Lovinsky, Adobe Brittany Johnson, PhD Student, NC State
12:00 – 1:30 p.m.	Luncheon & Keynote Speaker: Lisa Gelobter, The White House
1:30 – 2:30 p.m.	Special Session: Dr. Raquell Holmes presents ImprovScience ®
2:30 – 3:00 p.m.	Break
3:00 – 4:00 p.m.	Afternoon Session: Topics On Demand

4:00 – 5:00 p.m.	Afternoon Panel: Honoring Our Past, Looking into Our Future
	Moderator: Dr. Jakita O. Thomas, Auburn University
	Panelists:
	Dr. Raquel Hill, Indiana University
	Viola Thompson, ITSMF
	Ketly Jean-Pierre, PhD Student, Howard University
	Robin Brewer, PhD Student, Northwestern University
	Amari Lewis, PhD Student, University of California – Irvine
5:00 – 5:30 p.m.	Break
5:30– 7:00 p.m.	Dinner & Keynote Speaker: Dr. Fay Cobb Payton, NC State University
7:00 – 8:00 p.m.	Celebrating Our Present: Networking & Refreshing

Sunday, January 8th, 2017 – STRATEGIZING

7:30 - 8:30 a.m.	Breakfast
8:30 – 9:00 a.m.	Morning Welcome
9:00 – 10:00 a.m.	Breakouts – Theme Discussions
10:00 – 10:30 a.m.	Break
10:30 – 11:30 a.m.	Closing Session
	Breakout Debriefs
	Next Steps
	Open Planning
11:30 – 12:00 p.m.	Final Thoughts and Workshop Survey
	Dr. Jakita O. Thomas, Auburn University
	Dr. Jamika D. Burge, Capital One / Design & Technology Concepts
12:00 p.m.	Adjournment & Lunch

APPENDIX B: KEYNOTE SPEAKERS

Michaela angela Davis

Michaela angela Davis is an image activist. She is a writer, cultural critic, fashion, beauty culture editor, editorial brand director, commentator, speaker, conversationalist and community servant on issues of identity, race, gender and beauty.

Michaela is the creator of MAD Free: Liberating Conversations About Image Beauty and Power, a multi-platform conversation project with revolutionary women, and she has brought it to South Africa, India, France, Australia, New Zealand and beyond. The newest, The Hair Tales: Real Stories from Phenomenal Women delightfully explores the intersections of Black hair heritage, identity politics and pop-culture. She has served as the editorial brand director at BETNetworks and was the chief editorial creative consultant for the re-branding CentricTV – The First Network Designed for Black Women garnering the Promax Gold Award 2015. She is frequently seen with Anderson Cooper on CNN where she is a regular contributor. Additionally, she is regularly consulted for her commentary on culture and society, having appeared on OWN, PBS, Fox, MSNBC, BET, MTV, VH1, BBC, NBC and ABC.

Lisa Gelobter, The White House

Lisa Gelobter works for the White House, in the United States Digital Service. She is currently serving as the Chief Digital Service Officer with the US Department of Education.

Over the course of her career, Lisa has been integrally involved with the advent of several pioneering internet technologies, including Shockwave, the genesis of animation on the web, and the emergence of online video. Previously, Lisa was the Interim Head of Digital for BET Networks and was also a member of the senior management team for the launch of Hulu. Through the convergence of media and technology, Lisa has been fortunate enough to have had an impact on how, where, and when media is consumed and she is now bringing that consumer focus and transformative practice to bear in government.

Lisa is proud to be a Black Woman with a degree in Computer Science. Go STEM!

Dr. Raquell Holmes, Improvscience

Dr. Raquell Holmes is a pioneer in the use of improvisation and performance to advance scientific research communities. Trained formally as a cell biologist, Holmes works in the fields of high performance computing and computational sciences. As the founder of improvscience, she uses her training in human development and performance from the East Side Institute to help scientists build collaborative learning and research environments. She gives workshops, designs programs and delivers talks across the country that support scientists crossing disciplinary and cultural barriers to advance their own abilities and to broaden the scope of their research.

Holmes is also Research Assistant Professor at the Center for Computational Science at Boston University; Adjunct Research Associate Professor at the Simon A. Levin Mathematical Computational Modeling Sciences Center at Arizona State University and faculty of the East Side Institute of NY. She authored the Cell Biologist's Guide to Modeling and Bioinformatics and is the former Director of Outreach, Recruitment and Retention at the Center for Cell Analysis and Modeling of U. Conn. Health Center.

Dr. Fay Cobb Payton, North Carolina State University

Dr. Fay Cobb Payton is a Full Professor of Information Systems/Technology at North Carolina State University and was named a 2016 University Faculty Scholar for her leadership in turning research into solutions to society's most pressing issues. She is an editor for Health Systems, and an Associate Editor for Decision Sciences, DATABSE and Information Technology & People journals. She was named the 2016 North Carolina Technology Association Tech Educator of the Year and founder of @myhealthimpact, a platform that gives voice to black college students on health and social issues.

She received the 2013 National Coalition of Women in Information Technology (NCWIT) Undergraduate Mentoring Award. She is a member of the NC State University Women in Science and Engineering Advisory and is an American Council on Education Fellow.

She has appeared on CBS Radio Network, Black Data Processing Association (BDPA) iRadio, Sunrise America, Financial Review, National Public Radio and others to discuss her research

including user experience & design, health disparities/informatics, tech leadership, social and data analytics, and under-representation of under-represented groups in STEM. She was awarded the first SAS Institute Fellow for her work in analytics and teaching in the IS/IT class-room, and as received two NC State University Alumni Extension Awards.

She is the author of Leveraging Intersectionality: Seeing and Not Seeing, an anthology of her research on STEM education and experiences in both academe and corporate environments.

APPENDIX C: EVALUATION METHODOLOGY

The purpose of the evaluation was to provide summative information about the conference. The summative evaluation included documenting the themes and main discussion points during the two-day workshop, synthesizing feedback from participants, and validating the themes from the first Black Women in Computing workshop in January 2016.

We utilized a multi-method approach to the evaluation (Creswell, 1994, 1998). 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.

Utilizing a Culturally Inclusive Evaluation Methodology

As part of the BWiC work, Yamaguchi and Burge (2016) are developing a *culturally inclusive evaluation methodology* that includes honoring the voices from various perspectives. The theme, Lack of collective research about black women in computing from the first BWiC workshop, came about during discussions where black women in computing are researchers focused on computer science. Yet, these CS researchers acknowledge the need to conduct social science research (and evaluation) on effective educational, social, and structural strategies to promote more black women into computing. While acknowledging the need to research effective strategies to promote more women of color in computer science, the participants and researchers from the BWiC workshop expressed concern about not wanting to be "test subjects." The culturally inclusive evaluation methodology bore out of this theme and need.

Social science evaluation methodology is multi-faceted, and covers multiple topics such as:

- Data collection instrument (e.g., surveys, assessments, interviews),
- Data collection (e.g., primary, secondary, administrative, programmatic)
- Data type (e.g., qualitative versus quantitative),
- Data analysis (e.g., ethnography, theme analysis, impact, psychometric),
- Research design (e.g., random assignment, quasi-experimental, observational),
- Research philosophy (e.g., positivist, constructivist),
- Research phases (e.g., development, efficacy, effectiveness, scale-up), and
- Research questions (e.g., primary/ confirmatory contrast versus secondary/exploratory contrast).

Across these topics, conducting culturally relevant evaluation is not necessarily new. There are many methods and viewpoints on how to do so—from participatory evaluation, multi-cultural evaluation, to process-oriented evaluation (Frechling, 2002; Frierson, Hood, & Hughes, 2002; Patton, 2011). There are also many viewpoints on how to conduct rigorous evaluations, as if cultural responsiveness is somehow diametrically opposed to rigor (see Figure 7). From the BWiC theme, there is clearly a need to do both simultaneously.

One of the challenges in reviewing these various evaluation methods is that they are all focused on the evaluator or social scientist as the lead agent, the driver who identifies the research question, designs the study, collects the data, and analyzes the data. The evaluator leads the evaluation, either minimizing their impact on the intervention (e.g., external evaluation), or taking full part in the intervention (e.g., participatory evaluation). The evaluator interprets and analyzes the data. The evaluator writes the report and presents to the participants. The various evaluation methods are still uni-directional, where the evaluator's voice is the most prominent.

Figure 7: Tensions between various evaluation methods
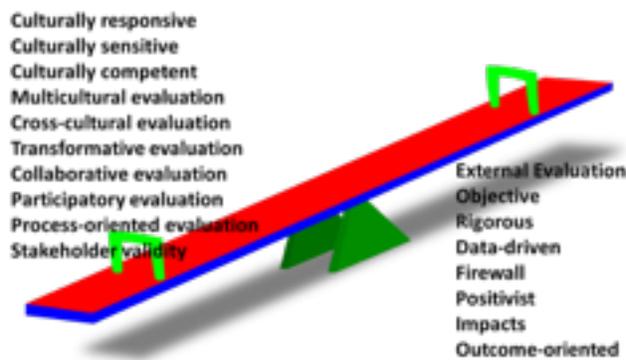
To address this methodological need, Yamaguchi and Burge (2016) are developing and testing a methodology that incorporates rigorous external evaluation methods, such as triangulating data, conducting unbiased external analysis, and conducting face validity, with participatory, multi-cultural evaluation methods. Our methodology has several key features:

- Strong collaboration with participants (i.e., black women in computing), researchers (i.e., CS researcher), and an external evaluator (i.e., social scientist).
- Theme analysis from multiple perspectives, initially conducted by the participants and researchers.
- Face validity conducted by the external evaluator.

Strong Collaboration with Participants, Researchers, and Evaluators

In traditional evaluation methods, there is a value in having the evaluator external to the program (e.g. treatment). This "firewall" provides a level of unbiased data collection, analysis, and interpretation. However, this also creates a "test subject" type relationship between the researchers and participants.

Figure 8: Honoring and integrating multiple perspectives

Figure 8 shows our general approach, where instead of the external evaluator being separate, we purposefully integrate all three players in the evaluation process. All three actors (the evaluator, researcher, and participant) provide data, analyses and synthesizes the data (Denzin, 1994). The evaluator observes and takes field notes. The facilitator/researcher observes and takes field notes. The participant provides input via individual survey.

This process is different from participatory evaluation methods, where the evaluator fully participates with the participants to learn first-hand the experiences of the studied group. This is unrealistic in this case (and many other cases), where the evaluator will not become a computer scientist to experience first-hand the intersectionality of race and gender in computer science. Rather, our methodology relies on the collaboration between the actors to produce culturally inclusive analysis and results (Frierson et al., 2002). In essence, to conduct culturally inclusive evaluation, the team has to be culturally inclusive.

Theme analysis from multiple perspectives, initially conducted by the participants and researchers.

The collaborative approach entails multiple data sources—observations and notes from the evaluator perspective, notes from the researcher (who has the content background), and input from the participants. In traditional evaluation methods, the evaluator takes the various data sources and conducts the theme analysis (Patton, 2002; Strauss & Corbin, 1990). This is the "firewall" approach to rigorous evaluation.

In our approach, the CS researcher is better equipped to conduct the analysis given their background in computing and their personal experience in this field. The CS researcher facilitates a theme analysis with the participants (other CS professionals) to identify salient themes based on the various data sources. The evaluator comes in at the end of the analysis cycle to review all data points to conduct face-validity.

Therefore, the theme analysis has three steps, summarized in Figure 9:

Step 1. Small Group Discussion (Initial theme analysis)

During the small group discussion, the facilitator (the CS researcher) guides the participants to brainstorm and leads an initial analysis of themes.

Step 2. Large Group Discussion (Meta-analysis)

After the small group discussion, the group will reconvene to share and learn from each small group discussion. In this step, the main facilitator will guide a larger discussion to conduct a meta-analysis and identify the larger themes. In this stage, the results from Step 1 is synthesized even further and verified by the participants during the large group discussion.

Step 3. Validation of themes (Evaluator face-validity)

The evaluator takes all data produced from the workshop to verify the themes produced in Step 2. This is where the "firewall" occurs, at the end of the process, where the evaluator verifies themes based on the data points, as well as identifies any discrepancies in the data.
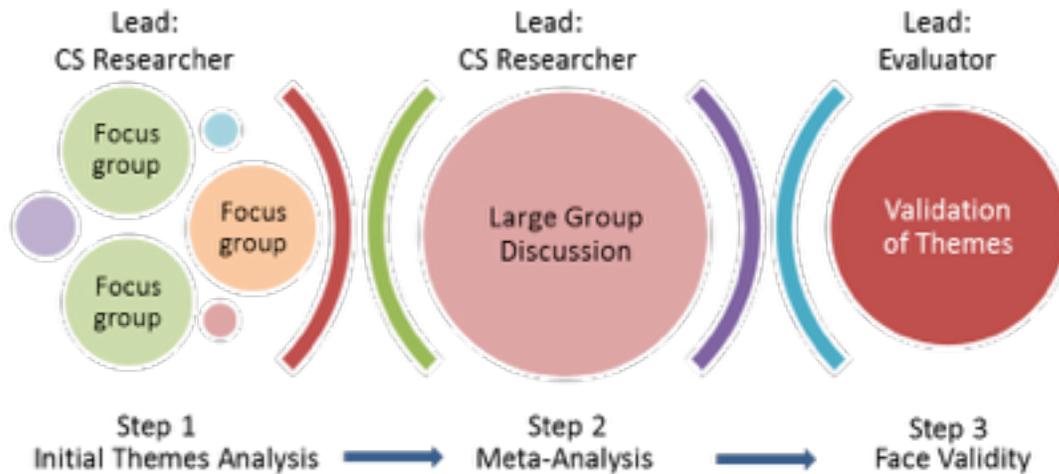
Face validity conducted by the external evaluator
In traditional evaluation methods, the evaluator conducts the analysis to ensure internal validity, and then asks the stakeholders for their input (e.g. face validity). The evaluator asks, "Are these results valid to you?" There are multiple problems with this conventional method: 1) the evaluator is not a computer scientist and will not understand the nuances of this field during the analysis phase, 2) CS researchers and participants are removed from the initial analytic process, and 3) the end result is findings that may not meet face validity.

Figure 10: Obtaining face validity
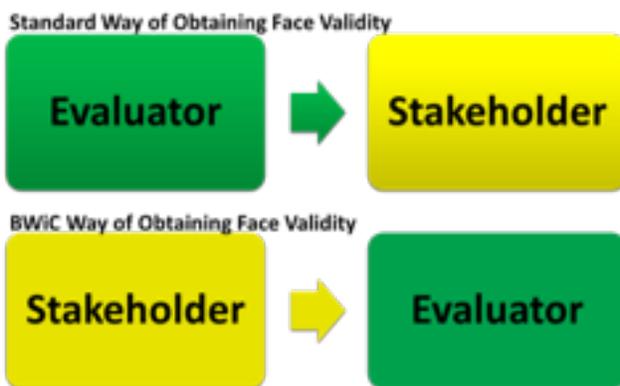
In our method, the analysis is first conducted by the CS researcher and participants (e.g. through the focus groups and meta-analysis of themes). The evaluator takes the results and verifies the validity based on the evaluator's independent review of the various data points (see Figure 10). This approach is similar to qualitative methods of having inter-coder reliability (Maxwell, 1998; Miles & Huberman, 1994). This ensures that an evaluation expert reviews the data and results. This is an opportunity to have the evaluator discuss with the researcher any discrepancies in the analysis and results, and lead an inter-coder reliability discussion. The key is the driver of the analysis and results, which comes from the stakeholder (e.g., CS researchers).

Data Sources

To document the discussions and themes during the two-day conference, we collected multiple sources of data, summarized in Figure 11, including:

1) Facilitator notes,
2) Facilitator and evaluator observations,
3) Pre-workshop survey,
4) Breakout session survey,
5) Post-workshop survey, and
6) Conference artifacts and 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 Facilitator	The evaluator and facilitator followed an observation protocol and observed each breakout session for 10-20 minutes.
Pre-workshop survey	Participants	One week before the conference, the participants were invited to complete a pre-workshop survey.
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.
Conference artifacts and documents	Participants	Group power point slide, flip charts during conference

Facilitator notes. The evaluator created a facilitator's guide for the breakout session. The evaluator trained the facilitators a couple of days prior to the conference, going through the facilitator guide, sample script, tips, and note taking requirements. Each facilitator/ co-facilitator took notes electronically, or by paper-and-pencil during the breakout session. The unit of analysis is the group level, where each breakout session had between 10-15 people.

Observations. The evaluator created a protocol prior to the conference. During the conference, the evaluator observed the panel sessions, breakout sessions, and discussions during

keynote speakers. The evaluator took detailed notes of the group interaction, key themes and discussion, and number of participants. The unit of analysis is the group level, where the observations were of the conference group (large group), or small groups during breakout sessions.

Pre-conference surveys. One week prior to the conference, all registrants were went an online pre-conference survey that included the following questions:

1) What is your **racial/ethnic** background?
   □ Hispanic, Latino, or Spanish origin

   □ White

   □ Black or African American

   □ Asian

   □ American Indian or Alaska Native

   □ Other

2) With what **gender** do you identify?
   □ Male

   □ Female

   □ Prefer not to say

3) How did you **hear about** the Black Women in Computing conference?
   □ I was personally invited by the planning committee

   □ I received a mass email about the conference

   □ I received a forward email about the conference from another colleague

   □ I heard about it through colleagues

   □ I saw a posting/ information about it on social media/ website

   □ Other: (Please specify)

4) What is your highest **educational degree**?
   □ Doctorate level

   □ Master's level

   □ Bachelor's level

   □ Other: (Please specify)

5) What **field** is your educational degree (Pick all that apply)?
   □ Engineering

□ Computer Science

□ Computer Engineering

□ Information Technology

□ Social Sciences (e.g., economics, psychology, sociology, anthropology, political science)

□ Physical Sciences (e.g. physics, astronomy, chemistry, earth science)

□ Life Sciences (e.g. biology)

□ Other: (Please specify)

6) In what sector do you **currently work** (Pick all that apply)?
□ University/ college

□ Non-profit

□ Corporate/ For-profit

□ Government agency

□ Other: (Please specify)

7) What would you say were **key factors of success** either as a black woman in computing or as a supporter of black women in computing?
8) What would you say are **barriers or challenges** that you see either as a black woman in computing or as a supporter for black women in computing?
9) In your mind, how could we, as a community, promote more **diversity and inclusion** in the field of computing?
10) Why is the Black Women in Computing conference **important** to you?

The overall response rate was 44% (35 respondents out of 80 registrants). The unit of analysis is the individual level.

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?

The overall response rate was 93% (64 respondents out of 69 participants). 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 registrants. Two email reminders were sent. The response rate was 58% (46 respondents out of 80 registrants). The unit of analysis is the individual level.

Conference artifacts and 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 12: Example of conference artifacts
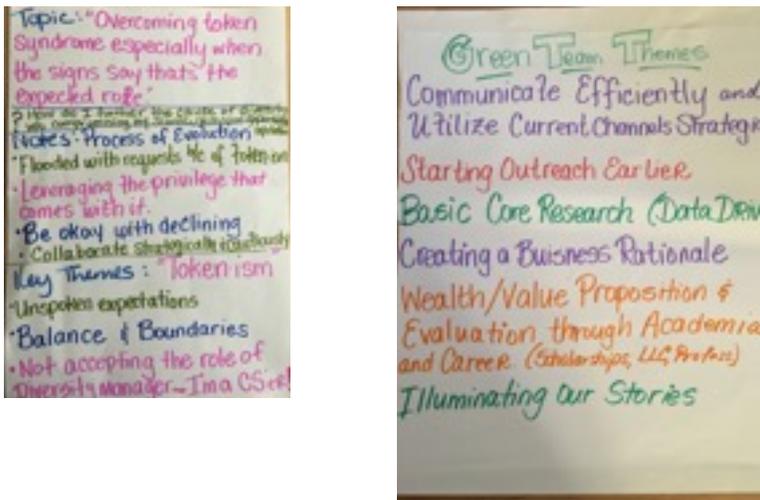
Taken together, the data sources are rich and varied, with data at the group and individual level, from different sources (e.g. evaluators, participants, and facilitators), and qualitative and quantitative data.

Data Analysis

The evaluator conducted thematic analysis from the qualitative data, including the observations, documents, field notes, and video narratives (Patton, 2011; Strauss & Corbin, 1990). The evaluator triangulated the results with the survey, using the survey to further verify the themes.

APPENDIX E: DATA COLLECTION MATERIALS

BWiC Breakout Session Facilitator's Guide

BWiC 2: Session VI Breakout Discussion

Facilitator's Guide

Session Theme:

Validating and Informing the Black Women in Computing (BWiC) Themes

Overview of 60 Minute Time Slot

Minutes	Activity
5	Facilitator- Introduce breakout discussion purpose
40	Facilitator- Lead group discussion on 7 themes and any additional themes
10	Facilitator- Synthesis of most salient themes for this small group
5	Facilitator- Give participant survey

Facilitator Packet

On Friday, each facilitator group will receive a packet that includes:

1. Breakout session surveys (~ 20)
2. List of names for your group to use to take attendance
3. Facilitator guide (this guide) as a resource

Evaluation Process

At the first BWIC conference in January 2016, we focused on three main guiding questions:

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?

Across two days, twenty-four professionals (mostly professors) discussed these questions in a series of small group breakout sessions and whole group discussions. Data included evaluator observations and notes, participant surveys after each breakout session, participant surveys post-workshop, and artifacts during the workshop (e.g., flipchart notes). The final results included the following 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 theme, Lack of collective research about black women in computing (Theme 5), came about during discussions where black women in computing are researchers focused on computer science. Yet, these CS researchers acknowledge the need to conduct social science research (and evaluation) on effective educational, social, and structural strategies to promote more black women into computing. While acknowledging the need to research effective strategies to promote more women of color in computer science, the participants and researchers from BWiC expressed concern about not wanting to be "test subjects."

In evaluating the BWiC workshops, the CS researcher is better equipped to conduct the analysis given their background in computing and their personal experience in this field. The CS researcher facilitates a theme analysis with the participants (other CS professionals) to identify salient themes based on the various data sources. The evaluator comes in at the end of the analysis cycle to review all data points to conduct face-validity. Therefore, the analysis has three steps:

Step 1. Small Group Discussion (Initial theme analysis)

During the small group discussion (i.e., focus groups), the facilitator (i.e., the CS researcher) guides the participants to brainstorm and leads an initial analysis of themes.

Step 2. Large Group Discussion (Meta-analysis)

After the small group discussion, the group will reconvene to share and learn from each small group discussion. In this step, the small groups report out their findings. The main facilitator will guide a larger discussion to conduct a meta-analysis and identify the larger themes. In this stage, the results from Step 1 is synthesized even further and verified by the participants during the large group discussion.

Step 3. Validation of themes (Evaluator face-validity)

The evaluator takes all data produced from the workshop to verify the themes produced in Step 2. This is where the "firewall" occurs, at the end of the process, where the evaluator verifies themes based on the data points, as well as identifies any discrepancies in the data.

The small group discussion is essentially a focus group of fellow black women in computing. During the small group discussion, there will be brainstorming of ideas and initial themes to report out to the larger group.

After the small group discussion and synthesis of themes, there will also be a large group discussion. This portion is the meta-analysis, where we synthesize and identify salient themes across all the groups. This large group discussion is another opportunity for participants to think about additional issues and themes, and be part of the meta-analysis of themes.

Taken together, the facilitator leads the small group and large group discussion, and conducts the first set of analyses. Data from the facilitator includes:

- Facilitator notes and observations of small group discussion
- Facilitator results of themes (first set of data analysis)
- Meta-analysis of themes (second set of data analysis)

The participants take part in the group discussions and first set of analyses. Data from the participants include:

- Small breakout session survey
- Post-workshop survey

The evaluator conducts observations and takes field notes during the workshop. Ideally, the evaluator observes each small group discussion for 10 minutes, following a structured observation protocol. The evaluator takes the following data points for the final set of analysis (third set of data analysis/ face validity):

- Registration (pre-workshop) survey
- Small breakout session survey from participants
- Post-workshop survey from participants
- Small breakout session notes from facilitator
- Small breakout session artifacts (group notes, post-its, etc)
- Large group meta-analysis notes from facilitator
- Large group session artifacts (post-its, etc)
- Evaluator observation notes throughout the workshop

The evaluator reviews all eight data sources, verifies the themes and results developed by the researcher, conducts any inter-coder reliability with the lead facilitator, and finalizes the results.

Your Role as Facilitator and Co-Facilitator

As a facilitator for the small breakout sessions (step 1), you are part of this methodology, where you will collect and analyze data with the participants. You will lead a small group discussion, and then lead an analysis session to synthesize the discussion into salient themes (step 1 initial theme analysis). As a co-facilitator, you are also part of this methodology, where you will take field notes, help to analyze data with the facilitator and participants, and document the final themes for your group. Decide between yourselves who will discuss and lead the synthesis, and who will take notes.

Facilitator
Your role is to: 1) Lead the discussion, 2) Keep time to 40 minute group discussion, and 3) Give participant survey. Make sure you:
- Use the facilitator guide to have a rich discussion

- Give the participant survey
- Keep to the time

<u>Co-Facilitator</u>
Your role is to: 1) Help the lead facilitator keep the discussion going; and 2) Take facilitator notes. Make sure you:
- Use the facilitator guide to take observation notes, document discussion, especially during the synthesis part of the discussion
- Confirm participant survey administration

Facilitator's Guide and Protocol

The breakout sessions are small group (ideally no more than 10 people, but for BWiC 2 work-shop, we might have up to 20 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:

- Ask 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".
- Use sticky notes as a tool, where you ask participants to write down ideas and post it on the wall. As a group, walk through the comments and group them according to categories.

During the session, as co-facilitator, please take notes, including both observation notes (your thoughts and interpretations of discussion), as well as documentation notes (the group's identified themes). In your notes, please identify who is in your group (names if possible to link back to their survey data).

Under each agenda item, there is a sample script, tips for the facilitator, and tips for the co-facilitator taking notes. Please use this as a guide to help as you facilitate an engaging conversation, but not as a formal script to read to the participants.

I. Introduce Breakout Discussion Purpose (5 minutes)

Sample script: Welcome to this breakout session! I'm <state name>, and I'll be facilitating this session. During the next hour, we'll brainstorm, discuss, and identify themes related to the intersectionality of race and gender in computing. 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 herself.

- ☑ **Co-Facilitator tip**: Cross off name on the participant list.

II. Lead group discussion on 7 themes and any additional themes (40 minutes)

Sample script: In January 2016, we held our first Black Women in Computing workshop, where we had 24 computer scientists discuss themes around the intersectionality of race and gender. We had guiding questions, such as:

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?

These three questions resulted in the following seven themes:

For the next 30 minutes, let's talk about how these themes resonate to you, and whether there are other issues and themes to add. These themes are a jumping off point, so let's talk about key issues you are thinking about as a black woman in computing.

We'll be talking about key issues, and talk about factors, barriers, and our experiences. We want to make sure we capture our discussion so (co-facilitator) will be taking notes. Is that OK? (Get verbal consent of note taking)

- ☑ **Facilitator tip**: The goal is to have participants not only verify the themes, but to come up with other themes. Sometimes it is easy to fixate on the 7 themes and get stuck in brainstorming new themes. You might want to lead with guiding questions, OR an unstructured question, such as "let's talk about key issues you are thinking about".

- ☑ **Co-Facilitator tip**: Your role here is to take notes. There are two kinds of notes—one type is your observations, the second type is documentation. Your observations are things such as group dynamics, individual contributions, and your thoughts on contributions, anything to give context to the discussion. Observation notes are your interpretation and analysis of the discussion and group dynamics. Your documentation notes are similar to a transcript, where you are documenting the ideas from the group. There is no interpretation but purely, your role is to document the various ideas.

III. Synthesis of most salient themes for this small group (10 minutes)

Sample script: In the next 10 minutes, let's review what we just discussed and see if we can come up with some major themes. We'll present these themes when we go back to the larger group.

From our discussion, I heard (number) of themes. I think I heard (say some major themes you identified). What do you guys think? Where there other themes from our group?

☑ **Facilitator tip**: There are \lots of ways to analyze data and create themes. You only have 10 minutes, so you might need to lead the discussion, identify major themes you heard, see if there is agreement, and see if there are any other themes.

☑ **Co-Facilitator tip**: This is where your notes come in. You might want to lead this part to say, "When I was taking notes during our discussion, I think I heard (number) of themes." Discuss with your facilitator which way to go. But, as a co-facilitator, this part is really important for you to take notes and document the theme.

IV. Give participant survey (5 minutes)

Sample script: This is great work. Thanks for your time and thoughts. When we go back to the big group, we will hear from the other groups, and have a larger discussion. Before we end, please 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.

Pre-Conference Survey

BWiC Pre-Conference Survey

Purpose: The purpose of the registration survey is to gather background information about each participant, and their thoughts about the intersectionality of race and gender in computing as it relates to their experience.

Name: _____

What is your racial/ethnic background?
- ☐ Hispanic, Latino, or Spanish origin
- ☐ White
- ☐ Black or African American
- ☐ Asian
- ☐ American Indian or Alaska Native
- ☐ Other

With what gender do you identify?
- ☐ Male
- ☐ Female
- ☐ Prefer not to say

How did you hear about the Black Women in Computing conference?
- ☐ I was personally invited by the planning committee
- ☐ I received a mass email about the conference
- ☐ I received a forward email about the conference from another colleague
- ☐ I heard about it through colleagues
- ☐ I saw a posting/ information about it on social media/ website
- ☐ Other: (Please specify) _____

What is your highest educational degree?
- ☐ Doctorate level
- ☐ Master's level
- ☐ Bachelor's level
- ☐ Other: (Please specify)_____
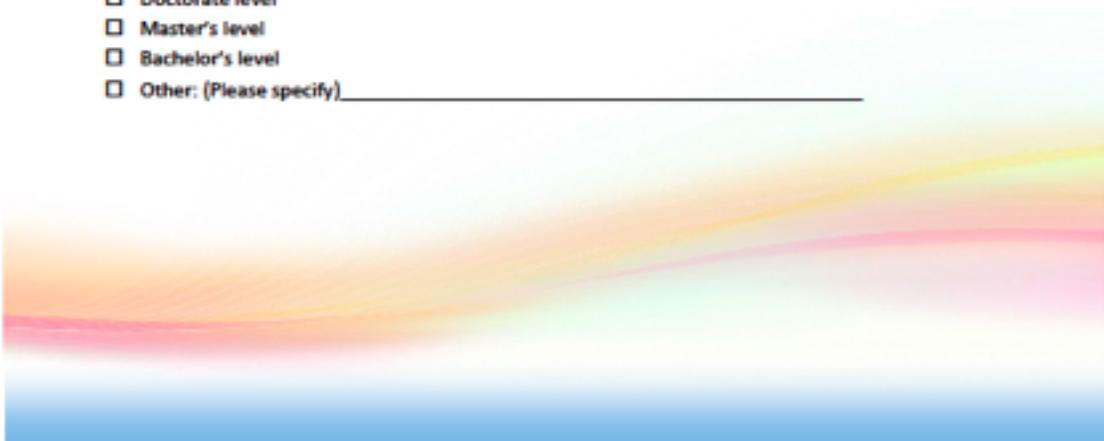
What field is your educational degree (Pick all that apply)?

☐ Engineering
☐ Computer Science
☐ Computer Engineering
☐ Information Technology
☐ Social Sciences (e.g., economics, psychology, sociology, anthropology, political science)
☐ Physical Sciences (e.g. physics, astronomy, chemistry, earth science)
☐ Life Sciences (e.g. biology)
☐ Other: (Please specify)_____

In what sector do you currently work (Pick all that apply)?

☐ University/ college
☐ Non-profit
☐ Corporate/ For-profit
☐ Government agency
☐ Other: (Please specify)_____

What would you say were key factors of success either as a black woman in computing or as a supporter of black women in computing?

_____
_____
_____

What would you say are barriers or challenges that you see either as a black woman in computing or as a supporter for black women in computing?

_____
_____
_____

In your mind, how could we, as a community, promote more diversity and inclusion in the field of computing?

_____
_____
_____

Why is the Black Women in Computing conference important to you?

_____
_____
_____

Thank you!

BWiC Session VI Survey

January 8, 2017

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, thoughts, or suggestions would you have for future workshops?
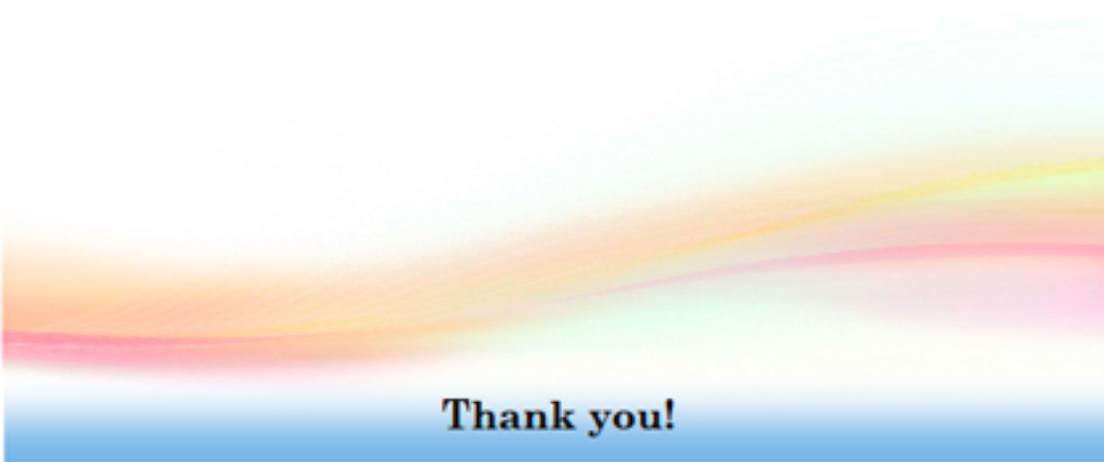
Thank you!

BWiC Post-Workshop Survey

January 8, 2017

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?
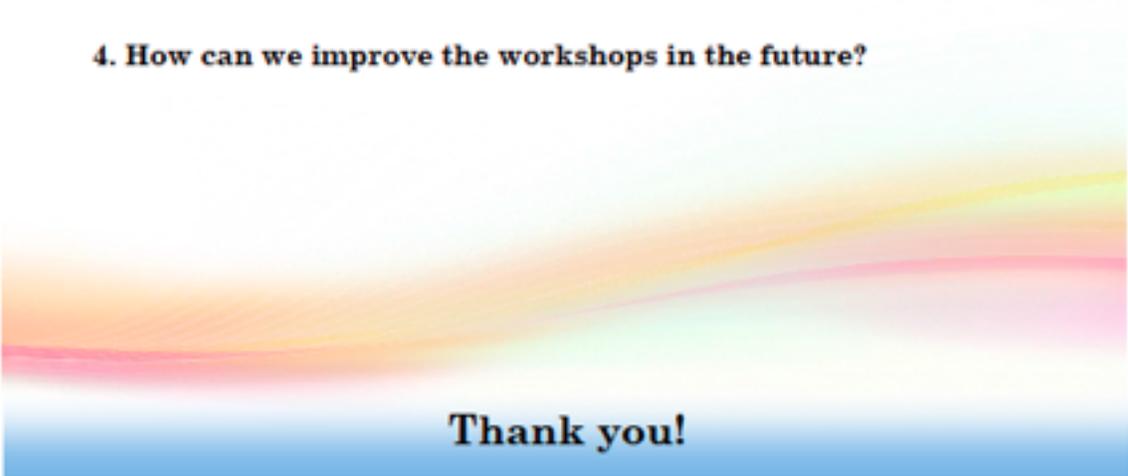
**Thank you!**

APPENDIX F: FULL RESULTS FROM SURVEYS

Pre-Conference Survey Results

The pre-conference survey was emailed to all 80 registrants a week prior to the conference. The overall response rate was 44% (N = 35)

How did you hear about the Black Women in Computing conference? (N = 35)
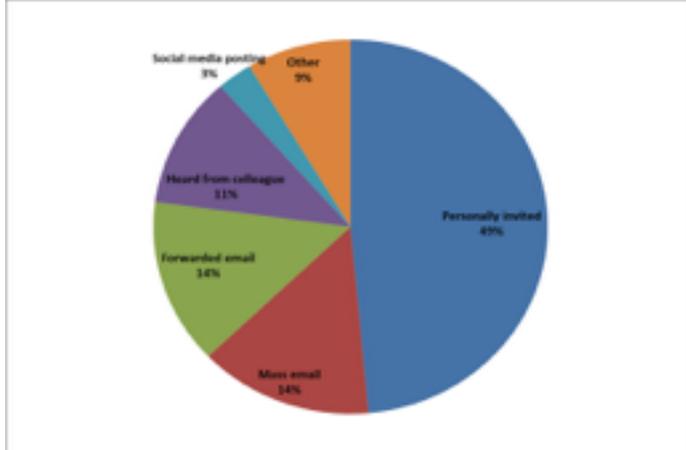

What is your highest educational degree? (N = 35)
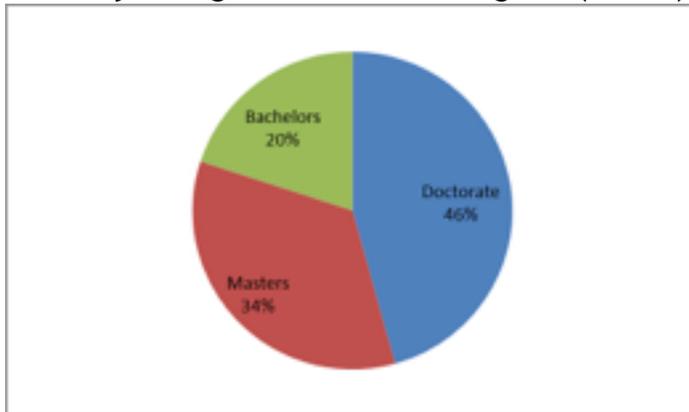
**What field is your educational degree (Pick all that apply)? (N = 35)**

Field	Percentage
Engineering	17%
Computer Science	66%
Computer Engineering	3%
Information Technology	11%
Social Science	14%
Physical Science	6%
Life Science	0%
Other	29%
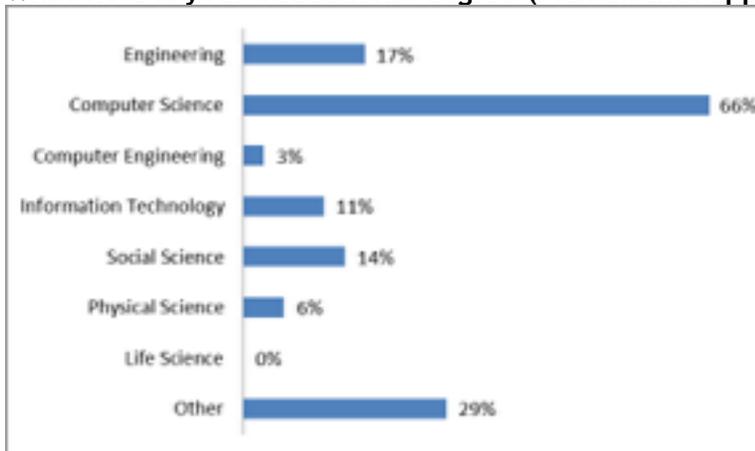
In what sector do you currently work? (Choose all that apply) (N = 35)

| Sector	Percentage
IHE	57%
Non-profit	17%
Corporate/ For-profit	17%
Government	9%
Other	11%

What would you say were key factors of success either as a black woman in computing or as a supporter of black women in computing? (N = 35)

| Factor	Percentage
Persistance/ resilience	23%
Understanding technology	9%
Community/ support system	54%
Mentor/ role models	40%
Finance	3%

What would you say are barriers or challenges that you see either as a black woman in computing or as a supporter for black women in computing? (N = 35)

Underestimate ability — 43%
Lack of interest/opportunities in CS — 17%
Lack of support — 26%
Lack of finance/resources — 3%
Lack of mentors — 26%

In your mind, how could we, as a community, promote more diversity and inclusion in the field of computing? (N = 35)

Promote BWIC community — 43%
Show CS relevance — 6%
Support and mentor — 34%
Collaborate and network — 20%
Reach out earlier (K-12) — 20%

Why is the Black Women in Computing Conference important to you? (N = 35)

Network — 97%
Supprt/Mentoring — 40%
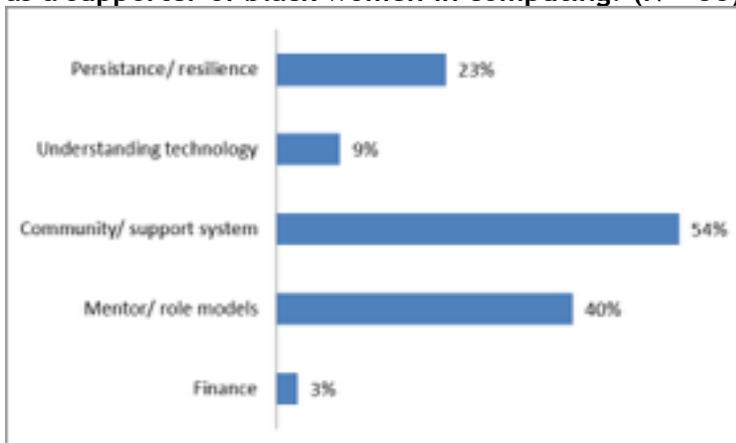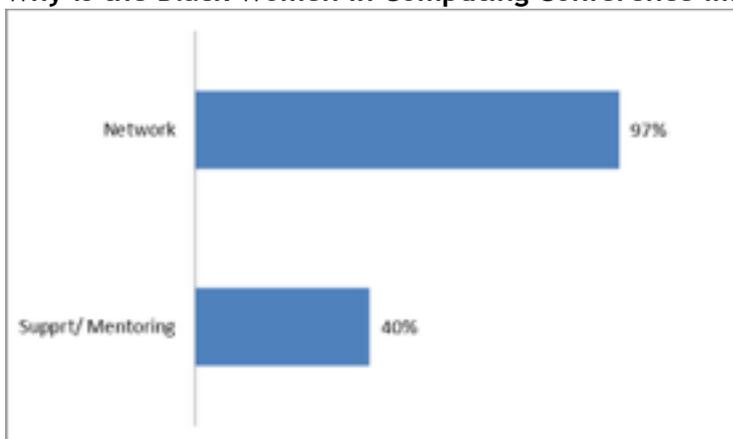
Breakout Session Survey Results

The breakout session survey was a paper-pencil survey, where respondents completed the survey during the breakout session. As such, the overall response rate was 94% (65 completed surveys out of 69 participants).

During the breakout session, what factors or experiences were the most relevant to your own experience? (N = 65)
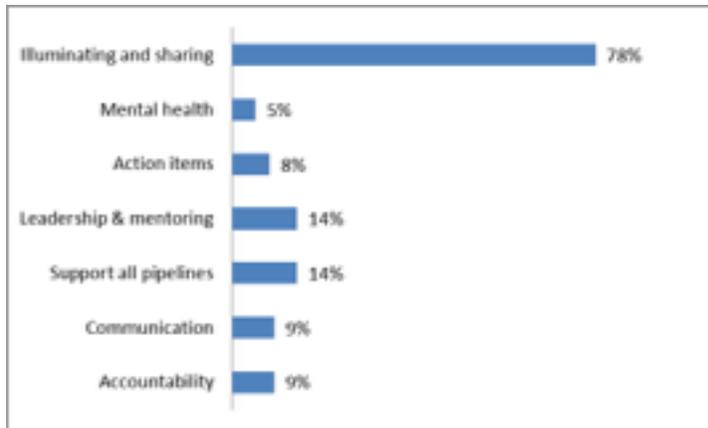
What additional factors or experiences would you add to inform the breakout session? (N = 65)

The following additional topics were identified by individuals:

- How much to assimilate,
- BWiC experience in an HBCU compared to a non-HBCU,
- Wealth creation (e.g. business/ start-up),
- Issues around single versus married BWiC, and
- Policy formation and knowledge.

What recommendations, thoughts, or suggestions would you have for future workshops?
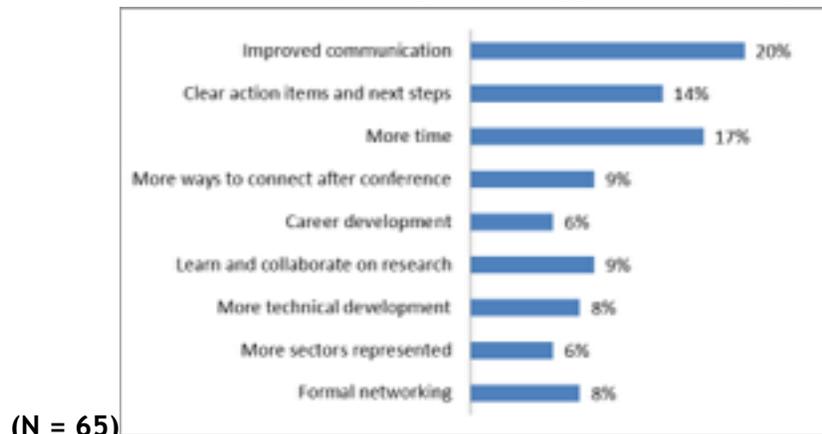

(N = 65)

Other recommendations included:

- Involving girls in this community;
- Involving and engaging allies and inviting other underrepresented groups;
- Focusing more on self care, persistence, and resiliency;
- Discussing how to cope with adversaries in the BWiC community;
- Offering sector specific workshops and workshops specific to stage in career;
- Learning about local politics and policy;
- Creating a "survival guide" or white paper on BWiC narratives,
- Conducting flash polls during the conference,
- Bringing allies and other BWiCs to the conference to grow the community,
- Creating a mission statement or values statement for BWiC, and
- Providing better food at the conference.

Post-Conference Survey Results

The post-conference survey was emailed to all 80 registrants a week after to the conference, with two follow-up reminder emails. The overall response rate was 58% (N = 46)

**List the top three things you learned during the conference. (N = 46)**
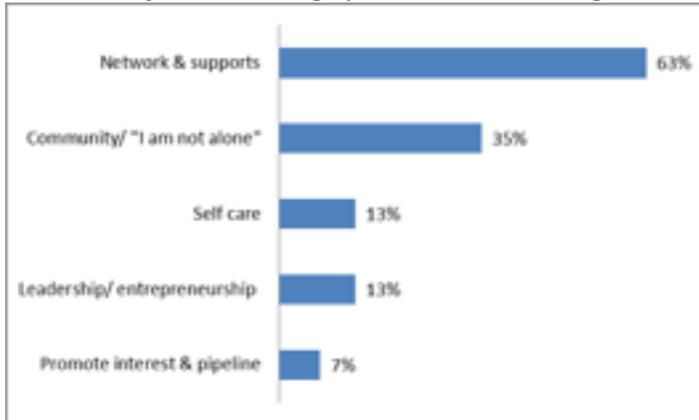
What was the most useful or valuable aspect of the conference? (N = 46)

What was the least useful or valuable aspect of the workshop? (N = 46)

Aspect	Percentage
Nothing	48%
Planning the conference	2%
Improv activity	7%
Last day goal discussion	13%
Last day breakout discussion	4%
Panel sessions	9%
Speakers	2%
Open discussion breakout groups	7%
Extended dialogue	2%
Long day on Saturday	2%
Quiet space not quiet	4%
Focus too much on academic setting	2%
Food	2%
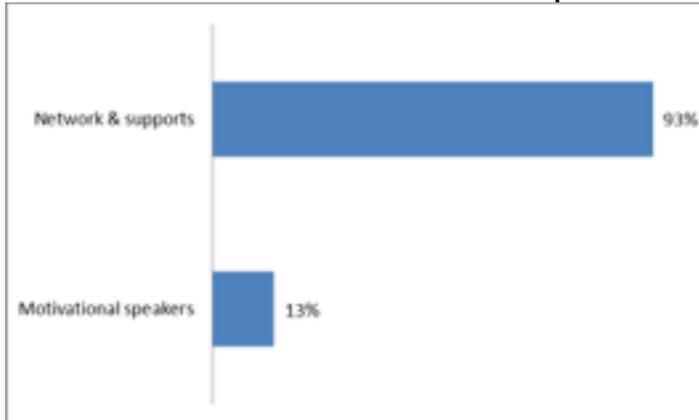
How can we improve the conference for the future? (N = 46)

Suggestion	Percentage
Create something together at the conference/ take-aways	11%
More sectors represented (Employers, industry, etc)	26%
Longer conference	28%
Speed dating/ structured networking	22%
Community Service/ Advocacy work	4%
Better organization of conference	4%
More space for conference	4%
Food	2%
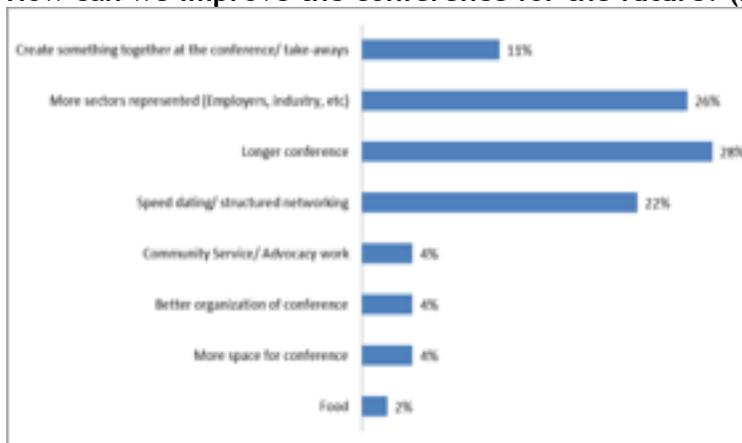
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