TRANSFORMING TRAJECTORIES FOR WOMEN OF COLOR IN TECH

Report Briefing

April 4, 2024

Study Sponsors

- National Science Foundation
- National Institute of Standards and Technology

The National Academies of SCIENCES ENGINEERING MEDICINE

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- **Alex Helman,** Program Officer *(Until October 2020)*
- **Marquita Whiting,** Senior Program Assistant *(Until August 2021)*

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Statement of Task

An ad hoc committee of the National Academies of Sciences, Engineering, and Medicine will examine strategies to improve representation of women of color in technology and issue a consensus report informed by a series of four regional workshops. The committee will:

1) Leverage the existing literature, and other resources as appropriate, to identify the factors that contribute to the underrepresentation and success of women of color in technology **(i.e. computer science (CS), computer and information science and support services (CIS), information technology (IT), and computer engineering)**;

2) Organize four workshops to bring together the regional community to solicit evidence-based, effective strategies for increasing the success of women of color in tech.

3) Identify, contextualize, and disseminate recommendations that policymakers, academic institutions, employers, and other stakeholders can use to have positive impacts on the recruitment, retention, and advancement of women of color in tech;

4) Catalyze the building of communities of practice devoted to increasing the success of women of color in tech; and

5) Empower policymakers, academic institutions, employers, and other stakeholders with evidence-based practices for improving the success of women of color in tech.

Based on the content of four regional workshops and other information gathered, the committee will issue a consensus report that a) identifies the factors contributing to the success of women of color in tech based upon the existing literature and other sources and b) provides recommendations that policymakers, academic institutions, employers, and other stakeholders can use to have a positive impacts on the recruitment, retention, and advancement of women of color in tech. The committee may also produce rapporteur-authored proceedings in brief for one or more of the workshops.

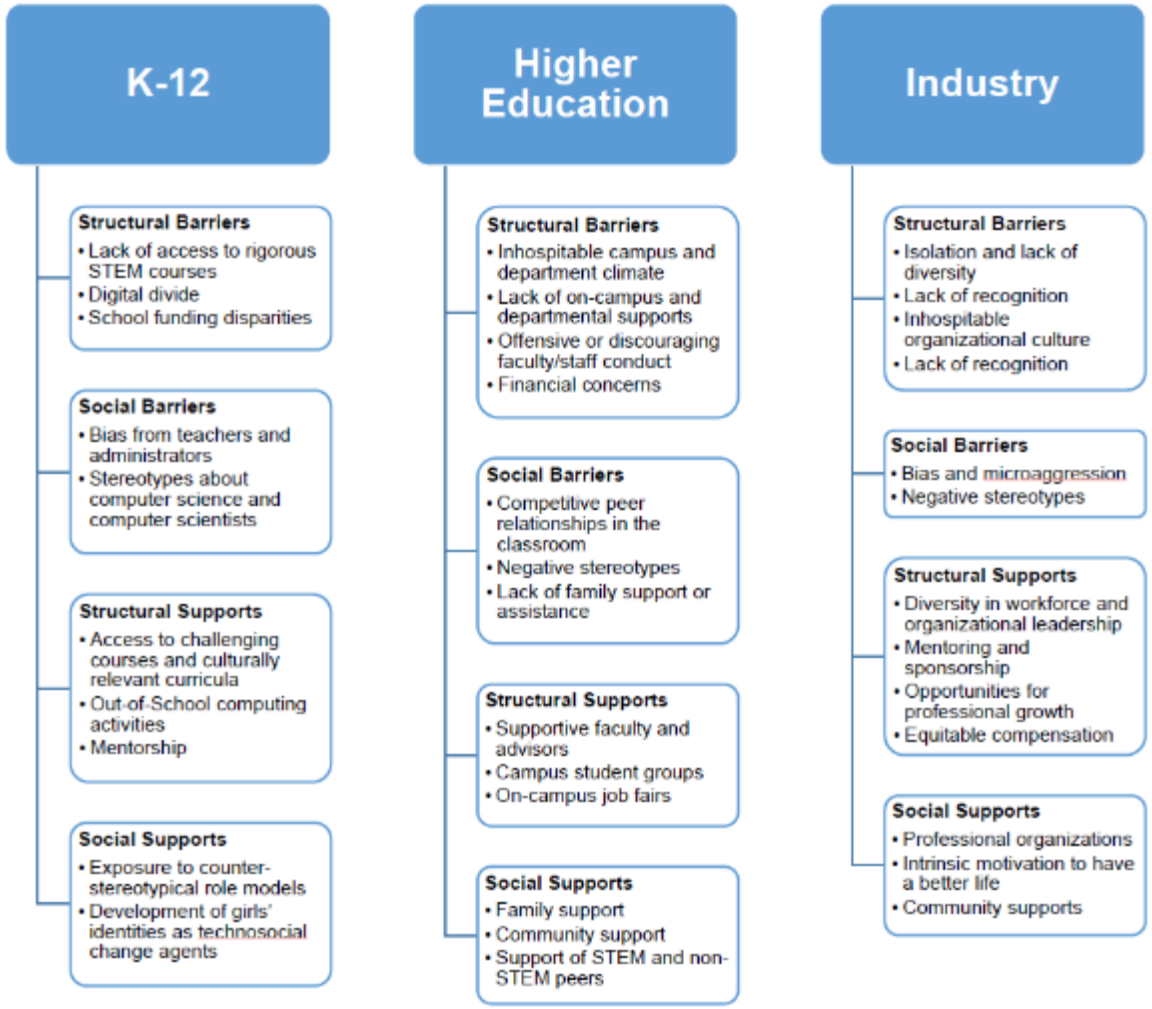
Study Approach

- 4 Public workshops (1 in-person and 3 virtual)
- 10 Closed-session committee meetings
- Commissioned review of existing literature
- Extensive review of sector-specific literature by committee members
- Information requests to federal agencies

Overarching Conclusions

- Taking an intersectional approach is necessary to understand the factors that influence the experiences of women of color.
- Disaggregation of data is a high priority need across sectors.
- Women of color are not a monolith—different groups and sub-groups have different needs.

Review of the Existing Literature



Social and structural factors at the K-12, higher education, and workplace levels that hinder or support girls and women of color in tech

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Review of the Existing Literature: Summary of Findings

- K-12
  - With effective supports, they are more likely to persist on a technology and computing track and major in a tech discipline in college.
  - Research suggests that providing counter-stereotypes improves self-concept and aspirations in computer science and other tech disciplines.
- Higher Education
  - Structural supports for women of color include supportive faculty and advisors, safe spaces for belonging; Social supports included family support of STEM interests, support from peers, and a sense of community.
  - A few of the studies specifically focused on HBCUs showed that these institutions provide a supportive environment, faculty who were engaged in student success, and sense of empowerment, and security.
- Workplace
  - Lack of diversity and resulting isolation, inhospitable workplace culture, and lack of recognition of women's achievements translated into slower rates of professional growth and promotion.
  - Structural and social supports that improve the experiences of women of color included: diversity in workforces and leadership, opportunities for networking, mentoring, and advanced training, and membership in professional societies that can support their specific needs.

Areas for Future Research and Funding on Women of Color

K-12	Higher Education	Workplace
• Differences in girls/women of color and non-Hispanic white girls with regard to: Digital divide, access to CS courses, quality of online learning, educational experiences during COVID-19 • Intervention components that can positively impact the identity, confidence, interest, and aspirations or girls of color in tech and related fields	• Impact of family support/encouragement and other early exposure experiences • Impact of finances and financial aid on entry and persistence in tech • Experiences of women of color at academic transition points • Experiences at MSIs • Experiences at technical and community colleges • Impact of peer mentoring • Experiences of graduate students who are women of color • Experiences of women of color in STEM and non-STEM community and counterspaces	• Effective recruitment and hiring of women of color in tech and related fields • Alternative pathway programs for women of color into tech • Experiences of women of color in STEM and non-STEM community and counterspaces • Award nomination and receipt rates for women of color • Intrinsic qualities of women of color that contribute to persistence in tech • How women of color in tech enter the field; how they are recruited, retained, and advance; reasons for persistence, and how finances impact entry and persistence

Recommendation Areas

- Future Research Agenda
- Higher Education
- Industry
- Federal Government
- Alternative Pathways to Tech
- Professional Organizations

Higher Education

Three Assertions to Excuse the Underrepresentation of Women of Color in Tech

Assertion: "We cannot find qualified women of color."

Stated Assumptions:

- Women of color do not pursue tech degrees due to lack of encouragement or interest.
- Women of color in tech are more interested in "soft" sub-disciplines.
- Faculty who are women of color are willingly opting out of academic careers in tech.

Assertion: "We just hire the best," "we are color blind," etc.

Stated Assumptions:

- Recruitment and advancement decisions are based solely on merit.

Assertion: "We have made progress."

Stated Assumption:

- Increases in diversity numbers mean that efforts to recruit, retain, and advance students and faculty who are women of color are working as needed.

Higher Education: Recommendations

- **RECOMMENDATION 3-1.** To foster continuous pathways for women of color in higher education, institutions at the departmental, college, and university levels should promote the collection of empirical qualitative and quantitative data that disaggregate the recruitment and graduation experiences of students, the recruitment and promotion and tenure trajectories of all faculty, and ascension to leadership positions for women of color.
- **RECOMMENDATION 3-2.** Institutions of higher education should collect and analyze disaggregated qualitative data to document the voices of women of color in tech and the narrated experiences of those who work with women of color that demonstrate how women of color fare in technology and computing courses as they navigate higher education at various levels.
- **RECOMMENDATION 3-3.** Higher education leaders should widen recruitment efforts to identify women of color candidates to join their computer science, computer engineering, and other tech departments as students and faculty, with increased consideration of those from two-year community colleges and minority-serving institutions, and should develop retention strategies focused on supporting these students and faculty during transitions to their institutions.

Industry

- Women of color remain a largely untapped pool of intellectual capital and cultural wealth for the tech workforce
- Data collection and disaggregation related to women of color in particular is scarce.
- Increasing transparency in data reporting is a critical first step toward creating systems of accountability, understanding the landscape of the tech workforce, and creating opportunities for the tech industry to improve diversity, equity, and inclusion.

Industry: Recommendations

- **RECOMMENDATION 4-1.** To enhance the accuracy of data reporting, tech companies should disaggregate employment data by tech and non-tech positions, job titles, gender, and race/ethnicity—with particular attention to the intersection of race/ethnicity and gender—and make those data publicly available. Reports should include information about trends in recruitment, retention, and advancement of women of color.
- **RECOMMENDATION 4-2.** Companies and organizations working within the tech sector should create pathways for women of color into leadership positions and create positions for diversity, equity, and inclusion professionals that are part of executive leadership.
- **RECOMMENDATION 4-3.** Tech companies, with the assistance of a neutral central organization, should initiate an ongoing cross-sector coalition with each other as well as other stakeholders such as academic institutions—especially minority-serving institutions (e.g., historically Black colleges or universities, Hispanic-serving institutions, and tribal colleges and universities)—and professional societies. This collective would allow member organizations and institutions to connect with each other with the goal of supporting current and future women of color in tech and promoting effective recruitment, retention, and advancement strategies for women of color in tech across all entities.
- **RECOMMENDATION 4-4.** Tech companies should expand employment options that promote work-life balance such as remote work, flexible work hours, parental and other family leave, and career counseling as a strategy to improve retention and advancement and expand recruitment of women of color.

Federal Government

- Women of color often fail to benefit from government efforts to the same degree as white women or men from underrepresented groups.
- Language in legislation has tended to focus either on women *or* on people from underrepresented groups in STEM.
- Some federal agencies have implemented programs intended to address the underrepresentation of specific groups.
- Federal agencies can also play a powerful role in incentivizing action at institutions of higher education through supporting programs that encourage transparent data collection and goal setting for efforts to promote diversity, equity, and inclusion

Federal Government: Recommendations

- **RECOMMENDATION 5-1.** Government efforts aimed at addressing the underrepresentation of particular groups in tech should intentionally account for intersectionality.
- **RECOMMENDATION 5-2.** Federal agencies should submit to Congress an overview of their programs that support the recruitment, retention, and advancement of women of color in tech with their annual budget request, as NSF currently does in its Summary Table on Programs to Broaden Participation (see Table 5-1 in the report). If agencies do not create such annual reports voluntarily, Congress should mandate that agencies do so.
- **RECOMMENDATION 5-4.** Federal agencies should incentivize grantee institutions' efforts to improve diversity, equity, and inclusion through accountability measures.

Federal Government: Recommendations

- In addition, the committee made recommendations
  - to ask that congress require the public release of EEO-1 workforce demographic data by companies—including those that are recipients of government contracts supported by taxpayer dollars. (Recommendation 5-3) and
  - to encourage partnerships between professional organizations and associations within the scientific community and advocacy organizations with a commitment to dismantling structural racism to expand their sphere of influence and increase outreach to policymakers on DEI issues in tech fields (Recommendation 5-5)

Alternative Pathways for Women of Color in Tech and the Role of Professional Societies

- Despite the growth in non-degreed, non-linear pathways into tech, participation rates for women of color remain low.
- With a focus on cultural relevance, tribal colleges and universities (TCUs) lead the nation in producing a highly educated and skilled Native workforce. TCUs are well- positioned to increase the number of Native women students in technology and computing.
- Both community and industry based programs may have higher appeal to people who are unable to afford traditional education after high school
- Although professional societies offer educational and informational resources and various kinds of supports, their influence is not often exercised as effectively as it could be to increase DEI.

Alternative Pathways to Tech: Recommendations

- **RECOMMENDATION 6-1.** Industry and funding agencies should invest in expansion of certification and training programs for women of color that are delivered by community-based organizations to scale their capacity to recruit and prepare a greater number of women of color in tech. These investments should expand opportunities for apprenticeships and people seeking to (re)enter the tech workforce.
- **RECOMMENDATION 6-2.** Funding agencies should invest in programs that provide scholarships to Native female students who pursue a graduate program in a computing-related field and commit to teach at a tribal college or university for the length of the scholarship.
- **RECOMMENDATION 6-3.** Higher education administrators should incentivize technology and computing-related departments to accept tech-related certification and digital badges, and should provide well-defined pathways for women of color and others from technology training programs offered by community colleges, industry, and especially community-based organizations toward earning associates, undergraduate, and graduate degrees in tech fields.

Professional Organizations: Recommendations

- **RECOMMENDATION 6-4.** Professional societies should create programs and/or initiatives directed at developing additional pathways that advance women of color in tech. These programs should have a strong evaluation component to demonstrate impact and provide recommendations for scaling successful models. Programming should include certification and badging options defined collaboratively with, and recognized by, industry and academic partners. Moreover, professional societies should be intentional about diversifying their internal leadership.

Next Steps

- Moving from the study to dissemination efforts resulted in the formation of the Dissemination and Outreach Committee:
  - CO-CHAIRS: Valerie M. Hammonds and Valerie Taylor
  - MEMBERS:
    - Sandra Begay
    - Jamika D. Burge
    - Ann Q. Gates
    - Edward D. Lazowska
    - Maria Ong
    - Fay Cobb Payton
    - Rati Thanawala
- Activities: presentations and briefings, development of a podcast, Expert Series meetings to create a systems map, **launch of an Action Collaborative**

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QUESTIONS?

To read or download a copy of the report, please visit: www.nap.edu.

For more information about the study or dissemination activities, please contact:

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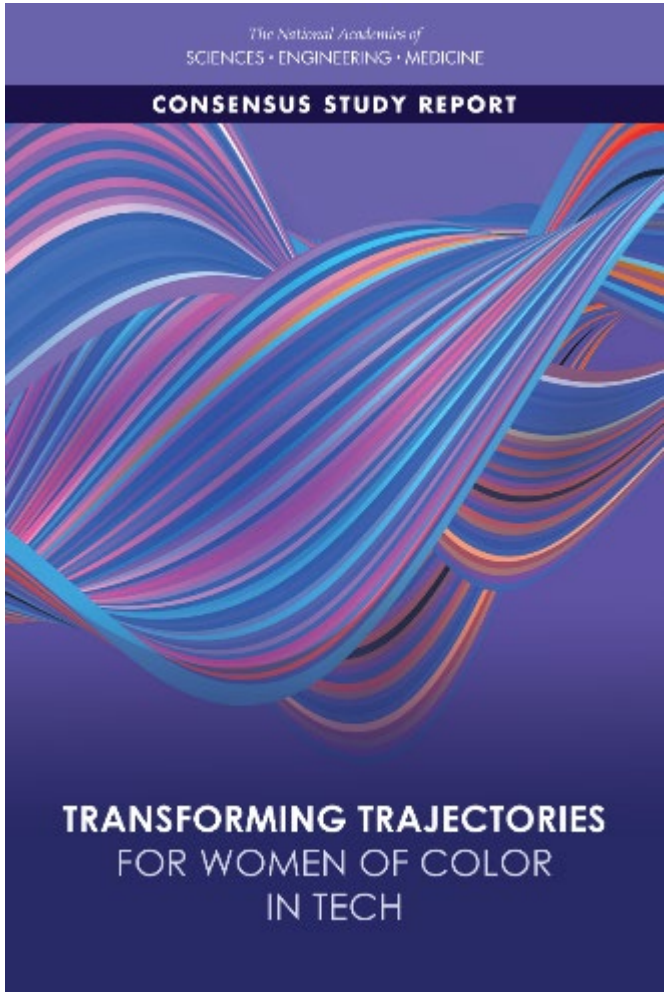

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