STEM Diversity and Inclusion Efforts for Women of Color: A Critique of the New Labor System

Kimberly A. Scott and Steve Elliott

Arizona State University, USA

ABSTRACT

There are sustained international efforts to increase the number and percentage of people of color who pursue STEM education and careers. These initiatives are most widely justified as means to provide human capital for technology companies. Particularly for women of color (African American, Native American, Latinx) in the US, far too many digital inclusion endeavors entrench women of color, sometimes unwittingly, in a labor system that treats them merely as commodities. As a result, women of color either avoid lives in computing or leave them. To display and critique some of the aspects of this phenomenon, we discuss it in comparison to the labor system of sharecropping in the southern US after the Civil War. We challenge those who fund, design, implement, and evaluate efforts at diversity and inclusion to see women of color not as commodities, but as agents with interests in social and economic emancipation and autonomy.

KEYWORDS

computer science, education, STEM education, equity, gender, race, coding, sharecropping

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INTRODUCTION

For quite some time, there has been much attention about why there continues to be so few women of color (e.g. African American, Latinx, Native American) entering and remaining in science, technology, engineering and math (STEM). The issue has assumed attention in the US particularly for technology and computer science related fields. In this article, we respond to 2018-year's conference question with a challenge.[1] Rather than focus on who *does* STEM and why, we invert the question and consider who does *not do* STEM, computer science in particular, and why not? Based on Scott's twenty-years of experience in leading and researching girl-centered technology programs (Scott, in press), we conjecture that disparity persists partly because many digital inclusion efforts reinforce, sometimes unwittingly, a labor system that has aspects similar to sharecropping. Before offering this perspective, however, we review the current state of affairs that prompts our critical analysis.

BACKGROUND

Recently, the Center for Gender Equity in Science and Technology at Arizona State University and the Kapor Center in California synthesized data from many sources about women of color and computing (McAlear et al., 2018).[2] The report shows that in computing education and industries, major disparities persist in participation, achievement, leadership, and rewards, especially for women of color. Females of color comprise nearly 20% of the total US population, a percentage the US Census projects to grow in the next 50 years. Regardless, women of color earn fewer than 10% of computer science undergraduate degrees. African American, Latinx, and Native American women together earn fewer than 5% of computer science PhDs, and they hold less than 6% of computer science jobs in Silicon Valley. For these women, being in the workforce does not translate into leadership, as they comprise fewer than 1% of executives, senior officials, and managers.

Data like these have ignited a swell of initiatives to provide girls and women of color the technical skills to enter and persist in computer science. Hundreds of millions of government and non-profit dollars have been spent supporting such programs. The most widely accepted justification for this response stems not from social justice arguments, but from the global need for human capital for the information technology industry (Popat and Starkey, 2019).[3] This reasoning provides occasion for pause and reflection.

Scholars note that, from the perspectives of societal institutions and dominant culture, Black and Brown bodies continue to have the status of mere commodities. In the US, this status persisted beyond the collapse of chattel slavery and into the 20th and 21st centuries, as the White dominant culture developed new systems of labor to maintain their economic and social superiority (Blackmon, 2009; Wright, 1986; 2013). Patricia Hill Collins (2006) discusses this commodity status among contemporary professional athletes and entertainers, and the particularly pernicious

effects it has on women. bell hooks (2014), in her classic *Black Looks*, noted that Black and Brown women are "food" for the desires for the Other, the dominant culture. If efforts to increase diversity in technology can be justified only by appeal to economic growth, then those attempts assume that so-called diverse bodies merely provide pepper for the workforce pipeline. To this end, the presence of the Black and Brown female body benefits those—especially White men—who already have capital and power in computing.

Computing education programs and initiatives targeting girls/women of color can be, and often are, designed and implemented for the ultimate interests of those already with wealth and power. Such programs enable a *labor system* for computing that poises women of color as commodities used to enrich others. To highlight features of this approach, we discuss the system of sharecropping that developed in the southern US between 1865 and the mid 20th century. We *do not* argue diversity efforts foster a labor system exactly like sharecropping. Rather, we suggest that there are features of the system that they do foster that are more easily seen by comparison with sharecropping.[4]

SHARECROPPING AND EFFORTS FOR DIVERSITY IN COMPUTING
In revisiting W.E.B. Du Bois's (1935) *Black Reconstruction in America,* we remember that after the Civil War, those African Americans who had been slaves, then called freed people, agitated for social and economic autonomy. They campaigned for: land with which to farm and sustain themselves; wages when they worked for others; and fair contracts between themselves and their employers, who were often former slaveowners and plantation owners. Poor Whites, and those in the planter class, feared the social mobility of Blacks; they worried that wage labor would enable the latter to move ahead of some Whites in the social hierarchy.[5] To combat the rising social status of Blacks, White supremacists in the US south enacted a range of countermeasures. These attempts included raids of terror for political and ethnic cleansing, systems of local Black Codes and eventually Jim Crow laws that effectively nullified the 14th and 15th amendments to the US Constitution, and alternative systems of labor that maintained antebellum social hierarchies (Du Bois, 1935; Foner, 1988; Jaynes, 1989; Blackmon, 2009; Wright, 2013). One such labor system was sharecropping.

Sharecropping has arisen in different forms throughout agricultural history, but the version of sharecropping in the US south possessed some noteworthy features. Most generally, sharecropping is a labor system in which a landowner allows tenants to live on and use the land to raise crops, often alongside the landowner, in exchange for a share of the crop yield. We highlight three aspects of sharecropping from the southern US context: semblance of desirability, constraints due to unquenchable debt, and differential effects. When relying solely on national or global economic justifications for diversity, efforts to broaden participation in STEM among people of color, and especially girls/women of color, can foster these features.

Semblance of Desirability
In the southern US sharecropper system, many freedpeople viewed sharecropping as the best available option, and at least better than slavery, for using their agricultural skills to increase their social and economic autonomies. Consequently, becoming a sharecropper *seemed* desirable, a pathway to future success. However, Black sharecroppers soon found themselves caught in a labor system that largely forestalled the possibility of economic autonomy, buried them in debt, tied families to geographic regions, and limited their opportunities. Being able to work the land did not provide them or their families the social mobility they imagined possible from a new labor system.

Today, computer coding is a skill necessary for entry into many computer and technology careers, and learning to code can provide students with a range of further cognitive skills (Popat and Starkey 2019). Coding academies, programs, and schools have proliferated, many targeting girls of color. For students of color and their families, enterprises such as Girls Who Code, Black Girls Code, and our COMPUGIRLS provide opportunities for technical training.

Some coding programs recognize tensions between histories of oppression and training girls of color for futures in technology fields. That said, marketing collateral often focuses on technology jobs, employing phrases like closing race and gender gaps in IT, filling the employment pipeline, and securing exciting and futuristic jobs. And program curricula often focus on mastering in-demand and employable skills. From our experience with COMPUGIRLS, these messages implicitly endorse those jobs and the labor systems into which they fit, a message often internalized by the students. Former COMPUGIRL students have expressed shame at deciding not to pursue technical careers, while those who did enter those careers have noted disappointment that the organizations in which they work exacerbate extant race- and class-based social hierarchies.

This feedback has forced us to reconceptualize how we design and appraise COMPUGIRLS as a program. Coding programs often measure their success by how well they help participants accomplish short-term goals like mastering a programming language, learning a tool, or applying for higher education. To provide more than a semblance of desirability for technology careers, we've developed curricula that help girls use technology not just as a means for getting a job, but as a means for helping to identify and address issues relevant to them and their communities. This shift helps girls identify social systems and institutions, long-term goals, and strategies for achieving those goals. As a result, girls discover how they can develop and use technology not merely to fit within extant social systems, but as means by which to construct new and emancipatory social systems (Ashcraft et al., 2017). More work remains to be done.

Constraints Due to Unquenchable Debt
Landowners developed ways to maintain nearly total control over sharecroppers, many of which involved miring sharecroppers in debt. Landowners dictated the terms of sharecropping contracts, setting both the standards for yields and ways to assess whether or not sharecroppers met those standards. As a disproportionate

number of Black sharecroppers could not adequately read the contracts or calculate their total yields, they relied on landowners' judgments of terms. Landowners used their advantages to keep contracts obscure and ever-changing. At the end of growing seasons, sharecroppers regularly found themselves in violation of terms, having allegedly produced too little yield, in debt to the landowner, and tied to the land for another season to pay off the debt. Furthermore, as the main crop was cotton, sharecroppers often needed to buy food and materials to sustain their families, and tools to work the land. Consequently, many sharecroppers took out loans from the landowners in exchange for these necessities. In the end, sharecroppers were plunged into further debt to the landowner, and their attempts for social and economic emancipation and self-determination were largely forestalled from the beginning.

Current student debt is a major factor for students of color pursuing higher education. In the US, for-profit institutions are enrolling a disproportionate percentage of students of color to pursue computing and information technology certifications (Bobb and Brown, 2017). They target people of color and sell their own semblances of desirability with ease of access and focus on career training (Deming et al., 2012). These programs poise students for low-level positions with little possibility for securing leadership roles or employment in leading information technology companies. Furthermore, students attending these schools, who are disproportionately women of color (ibid), graduate with significant debt from student loans (Looney and Yannelis, 2015). Combined with low-level skills that lead to low-level jobs with low pay, graduates default on their student loans at disproportionately high rates (Hillman, 2014). Their credentials do little more than further imbed them into debt that they cannot quench with the skills and careers for which they have been trained. Not too surprisingly, this also leads to persistent and generational race-gender gaps in wealth (Addo et al., 2016; Houle and Addo 2018). As for-profit institutions continue to expand into non-US markets, or as non-profit institutions adopt aspects of for-profit business models, these practices will likely similarly affect those most marginalized elsewhere.

Differential Effects
In the southern US, the effects of sharecropping were different for women than for men. Freedwomen who became, or were married to, sharecroppers experienced fewer social gains compared to their male counterparts. As a wife of a sharecropper, they lacked the power to negotiate their own contracts, so they relinquished their autonomy and the results of their labor to their husbands. Freedwomen in the sharecropping system were subject to gender and racial discrimination, were often viewed primarily in terms of their roles as mothers, and faced sexual harassment and abuse from landowners (Mann, 1989; Frankel, 1999). When they could, freedwomen in these situations fled to preserve their lives and well-being.

We note that women of color in computing and STEM face challenges unique to their situations, a phenomenon that researchers are just beginning to study. In their professional settings, women of color face both gender and racial discrimination, their expertise and commitment are constantly undermined—

especially if they have children, and they are pitted in competitions with each other (Williams, 2014). As a result, women of color in STEM struggle to maintain a sense of belonging or STEM identity (Ong et al., 2011). These experiences are common for women of color in computing, where they also experience extremes in cultural isolation, expectations, and stress (Thomas et al., 2018). They also experience more sexual harassment (National Academies of Sciences, Engineering, and Medicine, 2018) and unfair treatment (Scott et al., 2017). Despite their best attempts to persist in STEM and computing careers, women of color often experience daily assault and they leave.

CONCLUSION
On the surface, inclusion efforts seem desirable in their claims to provide girls and women of color technical (e.g. coding) skills to become participants in 21st century economies. Our critique, however, suggests that these enterprises place women of color in a labor system of racial and gender hierarchies, where they are constrained from achieving social and economic emancipation and autonomy. Given widely accepted economic justifications for efforts at inclusion in technology, and the history of using labor systems to subjugate people and especially women of color, too many initiatives to prepare students for technology jobs will further entrench them in the latest iteration of unjust labor and economic systems.

We urge those who develop, implement, fund, or evaluate efforts about diversity and inclusion in computing and STEM to consider more than just the skills they impart. They should also examine the labor systems into which those with the newly minted capacities will enter. This requires discussion and articulation of concrete and meaningful long-term goals, and of how inclusion efforts and education programs legitimately contribute to them. Closer collaborations with historians and sociologists, especially those who focus on legal, political, and economic institutions, are in order. These scholars can identify past social systems that fostered oppressive hierarchies based on gender and race, how those systems evolved into current ones, and similarities between past and current systems. With better knowledge about the social systems in which they intend to intervene, those who design and implement inclusion efforts can better identify strategies by which people, and especially women of color, can emancipate themselves from systems of oppression. They can also better distinguish those inclusion efforts that truly aim at equity from those who use language of diversity and inclusion merely to publicly grandstand while otherwise enabling oppression (Tosi and Warmke 2016). Granted, it is an open project to articulate principles by which to design digital inclusion programs. Nevertheless, all programs and initiatives should explicitly treat women of color as individuals with dignity and interests who can do far more than feed the Other.

ENDNOTES

[1] This is a revised version of the keynote Scott gave at the 2018 Gender and STEM International Conference at the University of Oregon.

[2] This is the first product of the Women of Color and Computing Collaborative. https://www.wocincomputing.org/

[3] We note that scholars propose many justifications for increasing the number of women of color in computing and STEM. Such explanations include individual economic growth, visibility as a legitimate technology user and designer, insertion of non-dominant worldviews into predominantly White spaces, etc. That said, if the human capital argument is not the dominant proposed justification, it remains widespread, especially among inclusion programs, funders, corporations, and governments. This rationalization serves a rhetorical function of appealing to, and thus making inclusion programs palatable for those who care more about economics than emancipation. Our worry, however, is that the rhetorical function can obscure or subsume other justifications, ultimately predisposing inclusion efforts to conform to the oppressive systems they otherwise seek to mitigate.

[4] These comparisons are heuristical and illustrative. Further comparisons to other kinds of labor systems, such as share wages and debt peonage, might also prove fruitful, and we encourage them.

[5] This phenomenon is now more generally labeled as last-place aversion and is especially relevant in poor Whites' attitudes to issues of minimum wage, healthcare, and welfare (Kuziemko et al., 2014).

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