Institutional Transformation: Supporting Equity and Excellence in STEMM

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Institutional Transformation:
Supporting Equity and Excellence in STEMM

By Shirley Malcom and Lindsey Malcom-Piqueux

In Short

- The rationale for increasing diversity in science, technology, engineering, mathematics, and medicine (STEMM) has evolved over time, but the approaches to making these fields more inclusive have yet to achieve large-scale success for racially minoritized populations.

- Diverse perspectives are necessary to fuel the high-quality research and innovation required to address humanity's greatest challenges and shape our future in a positive way.

- Institutional transformation is required to make STEMM fields inclusive given the disadvantages accumulated by minoritized populations over centuries of denial of opportunity.

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to our survival. Addressing these challenges in a manner that mitigates inequality is essential.

But the talent to take on these issues is being squandered by a science and technology community that does not reflect national and global diversity. In the absence of diverse perspectives, proposed solutions to our most critical challenges can reinforce existing inequalities and fail. For example, applications of machine learning (e.g., facial recognition software, self-driving cars) have been found to mirror racial biases, with potentially harmful results for minoritized populations. Similarly, race-based health disparities reflect how biases shape who benefits from medical advancements.

It matters whether diverse perspectives and people are involved in creating the enterprises, designing the technologies, researching the diseases, providing medical care, and shaping the future we will inhabit.

Perhaps more than ever before, our collective future is dependent on science and technology. Contending with the far-reaching consequences of a rapidly warming climate, an insecure food supply, and emerging infectious diseases is critical

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And yet, historically, science, technology, and medicine in the United States have not been inclusive. These fields have been emblems of exclusion, used as means to justify and carry out the mistreatment of racially minoritized populations. Although the most insidious uses of science have been discarded and denounced, science, technology, engineering, mathematics, and medicine (STEMM) still fail to reflect the diversity of our nation. People of color are consumers of the products of science and technology but have not had opportunities to shape the research and development agendas and decision making as to their design or use, largely due to lack of access, participation, and power within these fields.

Through our own research, we have aimed to understand patterns of access and participation in STEMM, the reasons for the patterns, and what might be done to transform these communities in the future. Efforts to broaden participation have spanned decades, but while there has been notable progress within some disciplines for some populations, African Americans remain severely underrepresented among STEMM degree holders and within the STEMM workforce.

Why, despite years of attention, investment, and programmatic interventions, has change been uneven and incremental? The answer is complicated and requires that we place the question into historical context.

CUMULATIVE DISADVANTAGE

Since our nation's founding, education has been used as a means to disempower and undermine self-determination of racially minoritized populations. From the forced enrollment of Indigenous children in boarding schools to anti-literacy laws in the slave codes, access to education was used as a tool to preserve and further White advantage. Throughout the expansion of schooling in the late 19th century, educational opportunity was distributed inequitably, purposefully disadvantaging Blacks and relegating them to segregated environments.

Although the *Brown v. Board of Education* (1954) decision established that in education separate was inherently unequal, it did little to change the conditions of schooling for most Black students. Even today, schools remain segregated for most students from minoritized groups, shaped by racialized housing patterns and accelerated, more recently, by school district secessions. In many places, school finance policies ensure that disadvantages accumulated over centuries will continue to grow. Students in affluent areas receive more resources and educational opportunities than their low-income counterparts. Even students of color enrolled in more highly resourced schools experience inequitable access to a broad, college preparatory STEM curriculum that includes critical learning experiences in lab-based courses, computer science, calculus, and other Advanced Placement coursework.

Similarly, the expansion of postsecondary education intentionally maintained systemic inequities for African Americans. Although there were some exceptions, Blacks were educated in segregated, underresourced environments. As the number of Historically Black Colleges and Universities (HBCUs) increased, their contributions in the post–Civil War period and importance to the educational advancement of Blacks were apparent (and still are today). In spite of continued underinvestment in their scientific infrastructure and enterprise (e.g., laboratories, equipment, research support) by the government and industry, HBCUs continue to make outsized contributions to the STEMM talent pool.

Across a range of educational indicators, African Americans experience some of the most severe inequities. Within STEMM fields, Black college students remain underrepresented despite their high levels of interest at matriculation. This connection between the past and present illustrates the systemic nature of the challenges we face. These inequities were created and institutionalized through centuries of purposeful denial of opportunity.

MAKING A CASE FOR FAIRNESS

Of course, this observation is not novel. Advocates for civil rights and racial equity have long

called for righting past wrongs through intentional action. These early efforts were rooted in the concept of fairness. Many have argued for better STEMM education for all and more attention and intervention for those who have been disadvantaged on the basis of fairness—the need to emphasize equity in access and participation. Since historical conditions shaped opportunities for many groups, the argument goes, these conditions can only be rectified by focusing on those who have been disadvantaged. As President Lyndon Johnson, in his 1965 commencement address at Howard University, stated:

> You do not take a person who, for years, has been hobbled by chains and liberate him, bring him up to the starting line of a race and then say, "you are free to compete with all the others," and still justly believe that you have been completely fair. (1966, p. 636)

Over the years, following his drive for so-called affirmative action, institutions of higher education (IHEs) put strategies in place to redress prior disadvantage. As requirements for affirmative action and equal opportunity were advanced, more opportunities were provided to students. The most able and socially connected within minoritized communities seized the opportunities for education and for jobs once requirements were in place to make the availability of positions more transparent, moving the needle from "none" to "a few."

But, over time, many remedies put in place by IHEs were found to be legally problematic as the Supreme Court considered case after case that narrowed the range of what was allowable in pursuit of diversity, equity, and inclusion in education. This, coupled with and driven by ideological shifts in federal and state governments beginning in the late 1970s, made continuing targeted programs designed to increase minoritized populations in STEMM fraught with political and legal risk. The arguments to continue efforts to broaden participation in STEMM shifted in response to changing political winds (Malcom, 1996).

Evolving Arguments: The Changing Demographics

Although many of the efforts to broaden participation in STEMM originated from ideals of justice, that rationale would not carry the day going forward. Policy makers and many in their constituencies argued that their narrowly defined conceptions of "merit" should determine who "rightfully earned" educational opportunity. Moreover, with higher education increasingly perceived as a private benefit earned by "meritorious" individuals, growing support for racial equity in STEMM required a shift in argument to be persuasive.

Many advocates for broadening participation in STEMM emphasized what the nation would lose by failing to diversify these fields, pushing arguments of justice to the background. Instead, broadening participation in STEMM was framed as a necessary condition to maintain economic competitiveness and advance national security in the face of the nation's changing demographics. Although some have critiqued this human capital–based argument, this very different framing led to expanded political and industry support for investment in efforts to increase participation in STEMM.

Given a rapidly changing American demographic, we see that groups historically excluded from STEMM education and careers are now the majority of the available talent pool. Such realization leads to some awkward questions about how to tap this pool: What does it mean to have intervention programs for the majority? How do we address the particular and specific equity needs of members of different groups? If the current structures of higher education do not work for *most* prospective students, how do we justify retaining them?

We can no longer avoid the discussion of systemic transformation. It is critical that inclusive policies and practices become the *norm* and that processes put in place for decision making in STEMM around faculty, students, courses, and scholarship reflect this new inclusive norm to both support a shifting demographic but also excellence in STEMM.

Shifting Narratives: Diversity, Equity, and Inclusion (DEI) as Essential to Excellence in STEMM

Evidence continues to mount of the relationship between DEI in STEMM and excellence in research, education, and practice (*Achieving the Promise of a Diverse STEM Workforce*, 2019). Quality science, responsive technology, and

person-centered medical advances needed to solve the critical challenges we face require diverse perspectives and real access to education and careers for everyone.

Achieving equity, however, requires different approaches for different groups. For African Americans, systemic transformation is needed because the disadvantages accumulated over centuries are deeply entrenched in our educational system. Only intentional removal of barriers and transformation of policies and practices can eliminate inequities.

Part of transformation is acknowledging the role that history has played in creating rules by and for the benefit of those traditionally in power. The playing field has never been level, yet we continue to play by these same rules, expecting different results. Fortunately, more institutions are considering taking concrete steps to change the game and advance racial equity. These steps include abandoning biased, nonpredictive admissions requirements like the SAT/Graduate Record Examinations and employing holistic review practices attentive to achievement despite barriers.

The Unpaid Debt

Some institutions are beginning to consider the past, their roles in creating present conditions, and the resulting implications for future action. Nearly every institution founded in the early days of the republic seems to have its own slave-related origins story, and nearly every institution seems to struggle with how to overcome its past. Perhaps the best way to settle the debts of the past would be for institutions to reimagine their futures, in ways that honor diversity, equity, and inclusion as essential to quality among their communities and within their teaching and in their scholarship—to engage in processes leading to real institutional transformation.

In STEMM it would mean lifting up the stories of pioneers who have been invisible, who bravely engaged IHEs that might have educated them but were likely unwilling to hire them. It means examining the place of diversity within the courses and curriculum, within the design of products or the setting of research agendas, and reaching out to schools and finding hidden talent who have not had opportunities to flourish. It means transforming institutions from places that take pride in their rankings, based on the records of those they accept, into ones that can also celebrate the value they add for those whose capabilities and creativity are not reflected in their test scores.

IHEs need to support K–12 education rather than blame it when students enter with inadequate mathematics and science preparation due to inadequate investment in the schools they attend and communities in which they live. Outreach can place STEMM undergraduate and graduate students within schools and in after school STEMM programs as role models and guides (e.g., in project-based learning). IHEs must educate and support teachers who are deeply grounded in science and mathematics who also understand the needs of their students for rigor, high expectations, relevant content, and culturally sustaining pedagogy. To do this, they must practice what they teach.

Research is emerging every day about the value of diversity in STEMM—in medicine, for example, in what is studied and by whom and in engineering, who is designing what for whom. But IHEs must first be willing to accept their complicity in creating and maintaining a system that has been exclusionary by design and begin a restorative justice process that seizes the opportunities to transform themselves into engines of change and social cohesion as they confront challenges to life on this planet that threaten us all. C

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