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# Inclusive Science Education Is Not Zero-Sum

The ethos of science requires many curious and creative people. Over the course of my academic career, I became convinced that making sure more people from different backgrounds could find success in research would be a more meaningful contribution to science than my own individual lab work in cell biology. I left academia in 2008 to direct the undergraduate science education programs at the Howard Hughes Medical Institute (HHMI). As I told *Science* magazine the same year, scientific discovery needs the "very best and the brightest, no matter what they look like and where they come from."

Early in my tenure at HHMI, I was what sociologist Marisela Martinez-Cola calls a "collector," believing that the problem of underrepresentation could be solved simply by cramming more students into a "pipeline" while disregarding the harm we cause when we treat students as an inert commodity. The "pipeline" approach has resulted in hundreds of programs primarily aimed at assimilating students into a science culture not of their making nor designed with them in mind. It has done little to address disparities.

Undergraduate students intending to study science and who identify as Black, Indigenous, or Latino are twice as likely as white and Asian students to leave an undergraduate degree in science, technology, engineering, and mathematics (STEM). Despite billions of dollars and more than three decades spent on interventions, the completion gap has not appreciably changed. It is revealing that other math-intensive fields, like business, have done a much better job at reducing racialized disparities. STEM's failure to close this gap—a gap which is an existential threat to science—suggests that the nation's engine for innovative problem-solving has been incapable of solving one of its own biggest problems.

After much patient tutoring by grantees, scholars, and our team at HHMI, I came to understand that pursuing diversity without inclusion amounts to a form of exclusion. We must abandon a "fix the students" mentality to focus on fixing the way we teach science. Underlying this commitment is a recognition that understanding how science works—the mix of curiosity and critical thinking that touches every facet of human life—is the right of every person, regardless of where they come from or where they are going. And, because science and technology affect so many aspects of our daily lives, including everyone not only improves science, it is essential for the democratization of personal agency in the twenty-first century. For me, the goal of diversity, equity, and inclusion (DEI) is for individuals with different lived experiences and divergent perspectives to genuinely feel that they belong and can contribute to the success of the larger community. This is inclusive excellence.

To this end, in 2015 my group launched the HHMI Inclusive Excellence program, which, over three rounds, awarded grants to support the efforts of 191 colleges and universities to center inclusion in undergraduate STEM learning. In the third iteration of Inclusive Excellence (IE3), schools formed learning communities that encouraged candid conversations of their attempts, failures, and successes. The faculty and administrator participants shared ideas about how to make undergraduate STEM learning more inclusive by reimagining the introductory curriculum, measuring and rewarding effective teaching, and integrating students transferring from community college into four-year institutions. These communities of grantees are doing the vital work that embodies the nation's highest hopes and most noble ideals.

On January 21, 2025, the day after his second inauguration, President Trump signed an executive order on DEI policies, stating that they are an "illegal preference and discrimination," rescinding many previous executive orders and actions, and encouraging the private sector to

end its own policies. The executive order described DEI policies as undermining national unity because they "deny, discredit, and undermine the traditional American values of hard work, excellence, and individual achievement."

This statement, and others that followed, have suggested that success is a zero-sum game, pitting inclusion against excellence and diversity against merit and hard work. In the past two months, many educational institutions, companies, and philanthropies have rescinded their previous commitments to DEI. People who had begun this work in good faith were left feeling they had done something wrong or shameful. The clock has been turned back to an outdated and exclusionary mindset.

On February 5, 2025, HHMI ended the Inclusive Excellence program; at the time, the 134 IE3 schools were a little more than one-third of the way into their six-year projects. This abrupt cancellation was deeply discouraging to the hundreds of faculty, staff, administrators, and students who had stepped up to pursue inclusive excellence.

The growing national climate of exclusion resonates deeply and personally for me. Eighty-three years ago, my parents suffered irreversible trauma through a deliberate act of exclusion. Executive Order 9066, signed by President Franklin Roosevelt on February 19, 1942, authorized the deportation from the Pacific coast of all persons of Japanese ancestry. Japanese American citizens and legal residents were imprisoned in hastily erected concentration camps located in desolate places in the western United States. My family was incarcerated in Poston, Arizona. It was in the Poston camp where my father's mother died at the age of 48. Imprisoned in 10 principal camps were approximately 125,000 internees, two-thirds of whom, including my parents, were US citizens by birth—the *Nisei*.

I am inspired by the many paths of resistance adopted by incarcerated Japanese Americans. At their core was the principle of *gaman*, which can be translated as endurance with dignity and stoicism. It means putting up with a wrong but never agreeing, never accepting, never succumbing to the idea that injustice is justified. *Issei* (first-generation) veterans of World War I donned their uniforms as they were herded onto buses and trains that took them to the concentration camps. Tens of thousands of second-generation Nisei men and women chose to "Go For Broke" (as one segregated combat unit's motto put it) by joining the US armed forces even as their families were imprisoned behind barbed wire. The "No-No Boys" chose a different form of protest, facing deportation by refusing to sign a loyalty oath to a country that had incarcerated them. Mitsuye Endo, Gordon Hirabayashi, Fred Korematsu, and Minoru Yasui challenged the internment in the US Supreme Court, grounding their approach in their country's Bill of Rights.

The work they began was carried forward by a new generation of *Sansei* (third-generation) resisters. Finally, in 1988, the United States formally apologized and awarded reparations to the internees who were still alive. For my parents, the apology was an emotional victory, but it could not erase the shame they had carried throughout their adult lives.

Our nation's evolution has been punctuated by diverse acts of resistance—sometimes loud, sometimes quiet, often persevering against long odds to build a better union. American resisters have fought for inclusion over the centuries, as abolitionists; through outlawed "Ghost Dances"; in decades of work against segregation; with quilts memorializing those who died of AIDS. Their actions have benefited all of us.

Now it's our turn. As scientists and educators, we must insist that inclusion remains at our core—for the country and for science. Here are some thoughts on how to continue the work of bringing science education to all.

***Commit to include everyone.*** In the spaces we control—such as our research team, classroom, or department—treat each person as an individual with unique potential, listen carefully, and stay alert to counter messages they may hear telling them they don't belong. When possible and appropriate, say, write, and post the words "equity" and "inclusion," explaining what these words mean to us personally.

***Be an ally.*** This is a scary time for colleges, universities, professional societies, foundations, and philanthropies—all of them imperfect organizations. Rather than rushing to cast criticism from a distance, we can become part of the solution. Let's support leaders who act against exclusionary policies and practices. And if a difficult decision has to be made to comply with laws or regulations, let us ask leaders to explain why they acted as they did.

***Get involved in accreditation.*** Regional accreditation is required for colleges and universities to receive federal funds, and accreditation is determined by objective peer review. We can make a difference by volunteering to serve on review teams. This is a great opportunity to network with and learn from faculty and administrators at other institutions and discuss with them how best to encourage and reward inclusive teaching and mentoring.

***Work toward interdisciplinary STEM education for all.*** At too many places, the introductory STEM curriculum is characterized by disciplinary silos and a focus on rote memorization. This exacerbates the gap in who participates in science and excludes many students with interest and potential even before they start. We must reimagine the STEM curriculum, emphasizing connections across disciplines, competencies, hands-on learning, personal relevance, and real-world social needs. We can work to build a more inclusive STEM learning experience through genuine partnerships that embrace different perspectives.

***Maintain a clear focus on inclusion.*** We know that science is not a zero-sum game, that inclusion and excellence are not mutually exclusive, and that an equitable future for all of us is possible. We must embody that through our actions.

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