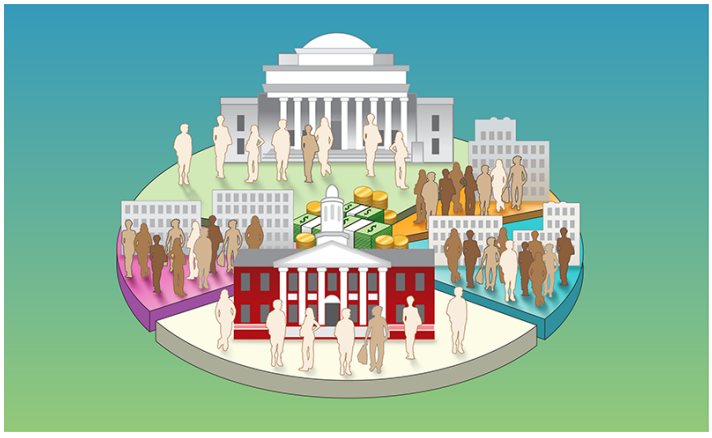
Toward More Equitable Academic Research

Legislation passed by the US Congress will help remove long-standing inequalities in academia—but more needs to be done to build a fair, inclusive, and efficient research system.

By **Anna M. Quider** and **Gerald C. Blazey**

Last summer, the US Congress passed the CHIPS (Creating Helpful Incentives to Produce Semiconductors) and Science Act—landmark legislation that strengthens the scientific and research enterprise in the US. The legislation includes important provisions addressing structural inequities in the distribution of federal research funding. As scientists from a university with a large majority of students from disadvantaged backgrounds, we believe that overcoming these inequities will be crucial to building a more inclusive and innovative research environment. We applaud the act and urge involved parties to work toward its full implementation. But more work remains to be done. In particular, federal agencies and academia as a whole should explore innovative approaches for improving the grant-allocation system.



Inequities in the distribution of federal research funding are crucial barriers to broadening and diversifying the participation in STEM disciplines.
Credit: APS/Carin Cain

In 2018, nearly 640 institutions received federal research funding for science and engineering, but 22% of those institutions alone received 90% of that funding (see **Building America's STEM Workforce**). These top institutions enroll only one-third of the underrepresented minority students from research colleges and universities. In other words, two-thirds of our nation's students of color only see one-tenth of federally funded research opportunities. Students from rural areas are also at a disadvantage. Of the 22% top institutions, 96% are located in urban or suburban areas.

The scale of these structural inequalities is corroborated by a recent study (see **Research News: Steep Hierarchies of Prestige in Academic Hiring**). This study showed that, in the past decade, 80% of US tenure-track faculty members came from just 20% of the PhD-granting institutions— numbers that are clearly correlated with the 22%–90% imbalance mentioned previously. The concentration of funding on a few campuses is problematic because participation in research is extremely effective for the retention of students and for the diversification of STEM. Removing these inequities is an essential step toward reaching what the National Science Foundation (NSF) calls the "**missing millions**"—those minorities who are yet to be engaged in STEM.

The impact of research-funding inequities can be illustrated through the personal stories of some students we have met or mentored. Asked about barriers to fulfilling their potential,

these students often mentioned a lack of access to research experiences at their home institution. One student told us that she depends on her year-round, part-time job in her college town, so she cannot jeopardize her employment by taking a summer break to carry out research elsewhere. Many students also said that they depend on year-round employment, are primary caregivers, have medical needs, or face myriad other barriers to moving. Having mentored undergraduate students from underserved urban and rural school districts, we have witnessed how these students can flourish through their participation in research programs they thought out of reach.

The CHIPS and Science Act takes important steps to address these imbalances by providing the policy framework to support research at emerging research institutions (ERIs)—higher-education institutions with less than $50 million in annual federal research expenditures. The legislation includes provisions that build capacity at ERIs and ensure their integration into federal STEM research and education programs. For instance, NSF programs will support the development of lasting and mutually beneficial partnerships between ERIs and large research institutions. Other provisions will stimulate the participation of ERIs in **regional innovation coalitions**. The Fostering STEM Research Diversity and Capacity Program will provide $150 million in grants for ERIs.

At the NSF, the act will also lead to increased funding for the Established Program to Stimulate Competitive Research (EPSCoR)—a program started in 1979 that aims to broaden the geographic distribution of research funding to states that historically receive little of such funding. The CHIPS and Science Act also directs the Department of Energy's Office of Science and the White House's Office of Science and Technology Policy to expand programs to broaden ERI participation. The Department of Energy has already acted with the Funding for Accelerated, Inclusive Research (FAIR) program.

These are all tremendous initiatives, but they depend on receiving money! So far Congress "authorized" the CHIPS and Science Act but still has to "appropriate" the funds that federal agencies need to spend. We urge Congress to act so that appropriations will soon match the act's targets. We also urge the NSF to implement the policy initiatives foreseen by the act as quickly as possible. And we call on the physics community—from professional societies to individuals—to solicit Congress and federal agencies to support and implement the act.

The CHIPS and Science Act is an important legislative step, but much more needs be done to broaden science and research participation. We offer here a few promising directions to both federal research agencies and academia.

First, grant reviews should explore peer-review processes that mitigate conscious and unconscious biases, such as approaches that are blind to both names and institutions of the applicants. NASA has successfully applied blind approaches to their telescope-time-allocation process, which resulted in increased awards to female and early-career scientists. The National Institutes of Health recently announced that they are no longer scoring applicant's expertise and institutions.

Second, national academies and federal research agencies should broaden their policy advisory committees to ensure representation of ERIs. Currently, these committees are predominantly composed of faculty members and administrators from institutions with the highest levels of research activities ("R1" institutions in the Carnegie Classification).

Finally, the American Council on Education, which is currently considering revisions of the Carnegie Classification, should develop new metrics that would incentivize partnerships between large and small institutions across academia. Switching to metrics not solely focused on the size of an institution's research program would have tremendous impact on building and diversifying the national portfolio.

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