

Revising legacy approaches to biology education

A Policy Paper by the Engineering Biology Research Consortium

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The pace of discovery and innovation in life science is fast and getting faster. DNA sequencing technology, for example, is 10 million times cheaper than it was twenty years ago and became an indispensable tool in the global fight against COVID. Yet, approaches to teaching biology, especially in high schools, have not kept pace. Too often biology is taught as a collection of facts to be memorized rather than as a tool for solving global challenges and securing quality jobs in the future.

As a nation, we must rethink how we teach biology. To remain globally competitive and prepare our citizens for the jobs of the future, federal agencies must prioritize programs that bring a modern mindset to life science education. A pedagogical change is needed for biology to be perceived as an engineerable solution to meet persistent global challenges, and an attractive career for all. There is an important role for the federal government to improve the way educational programs are designed, the way companies manage their hiring processes, and the way current and future employees find training throughout their careers. Federal agencies should incentivize the use of existing, free, and/or low-cost resources to creatively reimagine how and where biology is taught.

Specifically, federal funding should be appropriated to:

Launch an interagency Biology Career Pathways initiative that helps connect biology learning to real-world opportunities. Coordinated by the Department of Labor, Department of Education, and the National Science Foundation, this initiative would support paid high-school internships, technical training pathways, and first jobs in the bioeconomy. Existing models that are proven and ready to scale include the [BioMADE-funded Innovation Pathway](#) and [Digital Ready](#).

Move to establish biotechnology training as a core competency. In particular, the federal government should allocate persistent funding for relevant teacher training and high-quality instructional materials at the high-school level. Existing educational resources that could be scaled nationwide include the [BioBuilder Educational Foundation](#) that provides standards-aligned problem-based curriculum and out-of-school programming. A good goal would be to introduce at least one million high school students each year to a modern mindset in life science by the year 2030.

To equitably advance our country's residents into bioeconomy opportunities,¹ funding should:

Create bioeconomy-specific certificates and credentials that are used by industry and are attainable through secondary education. This effort should be administered by the National Science Foundation, with guidance from the Department of Labor, the Department of Health and Human Services, the National Institute of Standards and Technology, and the White House Office of Science and Technology Policy. With a modest allocation of \$5 million, federal agencies could create such a credential and

¹ <https://www.dayoneproject.org/ideas/meeting-biology-s-sputnik-moment/>

develop a digital platform that connects certificate-seekers to training providers and certificate-holders to companies.

Promote regional alliances of academic, philanthropic, and business entities in rural communities and communities of color. Funding from the Department of Commerce and others could support entrepreneurship workshops and grants, subsidize construction of shared lab space for startups, or provide incentives for faculty at local academic institutions to further develop their research discoveries into pilot programs, patents, and products. Over time, flourishing regional bioeconomy hubs will enable local students to pursue technical careers close to home, wherever home may be, thereby distributing the benefits of the growing bioeconomy throughout the country.

Invest in public-private partnerships so high-quality Learning Labs are open to the public in all zip codes. More than a century ago, public-private partnerships established the nation's public library system. Thirty years ago, Bill and Melinda Gates helped democratize digital technologies by providing PCs and training in 5,800 libraries for low income communities. Today, the federal government has an opportunity to re-deploy schools, libraries, and community spaces into bioeconomy tinker-spaces and training facilities. A nationwide system of ["Lab-raries" \(or "Libra-tories"\)](#) has the potential to support regional talent growth in all 50 states, reaching all Americans—including people of color, people with disabilities, and people from economically disadvantaged backgrounds.