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A Volunteer Army for Science

LATE LAST YEAR, PRESIDENT OBAMA ANNOUNCED AN “EDUCATE TO INNOVATE” CAMPAIGN TO INCREASE the engagement and performance of America’s students in science, technology, engineering, and mathematics (STEM). The United States has more than a million scientists and engineers over 60 years of age with bachelor’s degrees or higher, and nearly 600,000 doctoral students and 50,000 postdoctoral trainees in STEM fields. Existing volunteer programs prove that if the government were to dedicate new federal resources, tens of thousands of volunteers could be recruited from these groups and trained to help the United States achieve its national goals.

There are several successful models of programs that bring STEM volunteers into U.S. schools, from early to pre-college stages [kindergarten through grade 12 (K-12)]. In the early 1990s, government funds were used to help form two programs that allow senior scientists and engineers to assist teachers. Retirees Enhancing Science Education through Experiments and Demonstrations (RE-SEED), centered at Northeastern University, operates a middle-school program in the Boston area in addition to training volunteers in other locations. Teaching Opportunities for Partners in Science (TOPS) is led by the San Joaquin County Office of Education in California and targets elementary schools in five northern California counties. Both programs require volunteers to participate for an entire school year and commit a few hours a week. TOPS and RE-SEED have served as examples for more recent programs: the Senior Scientists and Engineers Volunteer Program of the American Association for the Advancement of Science (SSE/AAAS); the Maine School Science Volunteers; and RE-SEED of Silicon Valley, California. Other volunteer programs utilize seniors at different levels of commitment.*

Volunteer programs based in universities recruit younger STEM volunteers: graduate students, postdoctoral fellows, researchers, and students from science-based professional schools. The Science and Health Education Partnership (SEP) at the University of California, San Francisco (UCSF), which began in 1987, works with the San Francisco Unified School District and involves about 100 of its 115 schools. A major component of the program is classroom support, with more than 250 graduate students contributing over 8000 hours annually. Similar programs exist at many other U.S. universities.* In addition, the U.S. National Science Foundation’s GK-12 Fellowship Program has, for the past 11 years, provided financial support to nearly 6000 graduate students in science and engineering, each of whom spends up to 15 hours a week in local science classrooms as part of their fellowship obligation.

A key element of all these programs is dedicated leadership. A successful program requires a leader who recruits volunteers and teachers, delineates program expectations, provides support and training for volunteers, and assists partnerships when challenges arise. The training of volunteers is critical. An unprepared scientist who engages with students may do more harm than good, talking over the heads of the students and intimidating them. As an example, in the SEP/UCSF program, volunteers take a course that introduces inquiry-based science teaching, classroom and materials management, research-based teaching strategies, and lesson planning.†

Current volunteer programs rely on a mix of resources. To grow this effort, it is critical that the Educate to Innovate initiative include competitively awarded federal funding for such volunteer programs. A cost of \$100,000 per year is a rough estimate for a program with 100 volunteers. For every \$1 million spent on these programs, about 100,000 hours of classroom support could be provided, thereby harnessing a vastly underutilized resource for the benefit of K-12 science students. The White House has inspired volunteer scientists and engineers with its Educate to Innovate initiative. Now the Administration must provide the resources needed to help them succeed.

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*www.seniorscientist.org. †<http://biochemistry.ucsf.edu/programs/sep/workshops-and-classes-teaching-workshops.html>.

