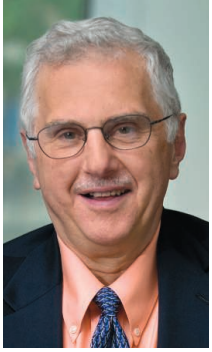

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Prioritizing Science Education

THIS SPECIAL ISSUE OF *SCIENCE* EXPLORES "GRAND CHALLENGES IN SCIENCE EDUCATION," A CRITICAL set of the problems and exciting opportunities now facing science education on a global level. The 20 Challenges, addressed by a team of education experts, range from "Enable students to build on their own enduring, science-related interests" to "Shift incentives to encourage education research on the real problems of practice as they exist in school settings." Here I propose three additional Grand Challenges. These focus on harnessing the wisdom of teachers, helping the business community promote new directions in precollege science education, and—last but not least—catalyzing major changes in the way we teach college-level science.

From my many close contacts with outstanding U.S. teachers, I have come to deeply appreciate their wisdom. They uniquely understand today's 5- to 18-year-old students and have many valuable suggestions for improving education systems. I am also painfully aware of the many past failures that have been caused by not giving the best teachers a strong voice in the public policies that profoundly affect their profession. In the 1980s, the Japanese taught the world that building a better automobile requires listening to workers on the assembly line. More generally, experience shows that actively soliciting advice from those most intimately involved is essential for wise decision-making at higher levels. Regrettably, education is one of the few parts of U.S. society that fails to exploit this fact. Hence, my initial Grand Challenge: "Build education systems that incorporate the advice of outstanding full-time classroom teachers when formulating education policy. " A start has been made,* but much more remains to be done (see the Perspective by B. Berry on p. 309).

To be competitive in the global economy, businesses need to be able to hire workers who can "think for a living." More specifically, studies reveal that the private sector seeks employees who can apply a capacity for abstract, conceptual thinking to "complex real-world problems—including problems that involve the use of scientific and technical knowledge—that are nonstandard, full of ambiguities, and have more than one right answer." These employees must also have "the capacity to function effectively in an environment in which communication skills are vital—in work groups."† Achieving the revolution in U.S. science education that is called for in the *Next Generation Science Standards* released last week‡ would go a long way toward creating the type of high-school graduates that the private sector needs (see the Perspective by R. Stephens and M. Richey on p. 313). Business leadership in the United States often fails to advocate for wise education policies, despite its potential for influence. Hence, my second Grand Challenge: "Harness the influence of business organizations to strongly support the revolution in science education specified in the *Next Generation Science Standards*."

Several years ago on this page, I pointed out that, "Rather than learning how to think scientifically, students are generally being told about science and asked to remember facts. This disturbing situation must be corrected if science education is to have any hope of taking its proper place as an essential part of the education of students everywhere. Scientists may tend to blame others for the problem, but—strange as it may seem—we have done more than anyone else to create it."§ College science courses are taught by scientists, and they define "science education," modeling for teachers and adults what should be done at lower levels. Most college faculty have not yet faced up to the urgent need to improve on the standard one-size-fits-all lecture format (see News story by J. Mervis on p. 292). Thus, my final Grand Challenge: "Incorporate active science inquiry into all introductory college science classes."

The aim is nothing less than a more rational world.

– Bruce Alberts

10.1126/science.1239041

*http://sites.nationalacademies.org/DBASSE/TAC; www.ccst.us/ccstinfo/caltac.php. †R. Marshall, M. Tucker, *Thinking for a Living: Education and the Wealth Of Nations* (Basic Books, New York, 1993). ‡www.nextgenscience.org/next-generation-science-standards. §B. Alberts, *Science* **323**,437 (2009).