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From the Desk of the NIH Director

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You may have read the recent news stories about the disappointing performance of U.S. students on an international science and math exam.[1] The future of biomedical research and the health of this nation both hinge on getting young people excited about science and health. Unfortunately, too many of them are leaving school without the analytical skills they need to be successful in today's economy, much less to become competitive researchers. Here at NIH, we are taking a multifaceted approach to engaging students from diverse populations in science and inspiring some of them to choose careers in research. However, there is only so much that we can do from Bethesda. Our best hope for making a broad impact on the children of this nation would be to have a grassroots movement of scientists across the country, rallying for improved science education in their own communities.

At the end of this Desk-to-Desk, I will suggest ways that you might use the tools developed at NIH to partner with local teachers and officials, and help revitalize American science education. I hope that many of you rise to this challenge. If those of us already passionate about science don't carry the torch, who will?

Our Children's Science Education: What You Should Know

Science education has been a concern in this country since the launch of Sputnik in 1957. Seeing our biggest adversary beat us into space lit a fire under American policy makers, educators, and the public. However, as detailed in books such as Thomas Friedman's *The World Is Flat* and the National Academy of Science's *Rising Above the Gathering Storm*, that fire desperately needs to be rekindled. [2], [3] American leadership in science and technology is once again at risk.

The performance of U.S. students is behind most other rich nations in the world—and quite a few that aren't rich. A 2003 study by the Programme for International Student Assessment (PISA) compared the problem-solving abilities of 15-year-old students from 40 nations around the world. (See the graph below.) The U.S. placed 29th. More than half of our children scored in the range that suggests they will have serious difficulties as they enter the workforce or even try to face the normal challenges of adulthood. American students were less than half as likely as students in the top-performing nations to achieve the highest level of problem-solving performance. (For more about the PISA and other education assessments, please see Appendix I in the new guide *Scientists in Science Education*. (PDF - 308 KB)

I believe that we scientists can agree that this is not what we want for our children, for our nation, or for the future of our field.

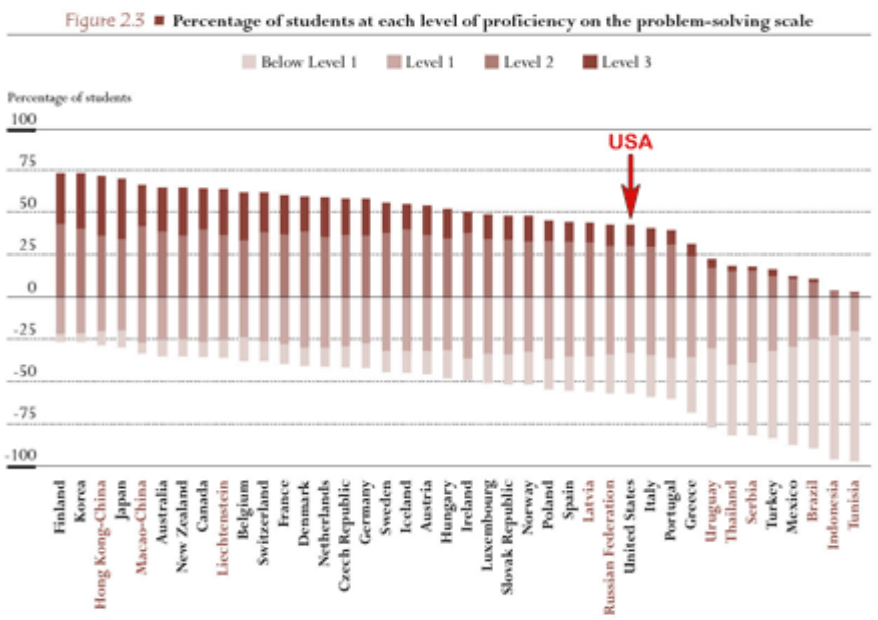

Figure from *Problem Solving for Tomorrow's World*. Countries are ranked in descending order of percentage of 15-year-olds at the two highest levels of proficiency (Levels 2 and 3, above the 0 line). Organization for Economic Cooperation and Development (OECD) member nations are depicted with a black font and non-members with a colored font. A larger version of this graph is available at the Web site http://science.education.nih.gov/pisa. The entire report can be downloaded at the Web site http://www.oecd.org/document/54/0,3343,en_32252351_32236173_34002550_1_1_1_1,00.html.

Science Isn't Just for Scientists!

Obviously, the next generation of biomedical researchers needs to be taught science, but why worry about everyone else? There are a few good reasons. Economists have estimated that as much as half of the post-World War II growth in GDP in the U.S. is attributable to technological progress that resulted from research and development. The world economy is changing, and with it, the skills that will be demanded in the promising jobs and the productive workforce of tomorrow. The international competition for a greater share of the wealth is heating up.[4] It is important for our citizens to understand more math and science than they ever have in the past, if we dream of continuing the American tradition of leadership.

Labor economists are now warning that more than half of our children may leave school without the skills they need to enter the middle class.[5] Business reports such as *Building a Nation of Learners and Tapping America's Potential* are suggesting that many companies are having increasingly difficult times finding the employees with the critical-thinking, problem-solving, and communications skills they need to do their jobs. [6], [7] A rigorous education in math and science can help prepare all students for good jobs, even those who will never wear a white lab coat. I encourage each of you to familiarize yourself with the National Academy of Science's recent report *Rising Above the Gathering Storm*, which discusses many of these issues.[3]

Science Literacy and the Burden of Illness

Improving science education may improve not only a child's economic prospects, but his or her health status as well. Children who learn about health and the science that underpins it will be better equipped to make smart choices—about diets and exercise, about smoking and drugs, and about choosing lifestyles that will help keep them mentally and physically fit. They will grow into adults better able to pick the insurance plans and choose the treatment plans that best suit their needs and the needs of their families. Better science education is one key to a more participatory style of healthcare, which will engage individuals and communities in building a healthier society, understanding and minimizing health disparities, and reducing the suffering and costs associated with chronic disease for all Americans. We are working on this with our sister agencies in HHS and will be announcing some bold, new initiatives soon.

Promoting Science, Health, and Science Education: NIH Curriculum Supplements

To many laypeople, science and technology are essentially one and the same. Many don't understand that science isn't about the high-tech devices we use or even what we choose to study. It is a way of *knowing*. It is a method of making sense of our world and of our universe. Science builds models of what is and tests hypotheses about what *will* be. At NIH, we use the tools of science to investigate human health and disease, and to improve the human condition. But we also recognize that the same thought processes we use can also propel our society,

culture, and economy, making a brighter future for our children and our children's children.

Therefore, although we focus our primary efforts on efficiently finding and funding the best research today and work to ensure the health of the scientific enterprise of tomorrow, we also make strategic investments in broader K-12 science education. An excellent example is the *NIH Curriculum Supplement Series-16* free, interactive modules for elementary, middle, and high schools that combine the latest science from our institutes and centers with state-of-the-art instructional approaches. The supplements are available free to educators at the Web site http://science.education.nih.gov/supplements. The supplements have been aligned to state and national science education standards so that teachers can fulfill their requirements, as they introduce students to the science surrounding important human health problems. More than 300,000 supplements have been distributed to date, each in response to a request from an educator. (Take a look at a map illustrating how the NIH curriculum supplement requests correspond to population density across the U.S. at this Web site http://science.education.nih.gov/map.) While we are thrilled by the broad interest, we would love to see them in even wider use. There is always an "activation energy" required when trying something new, and even good teachers can be intimidated by working state-of-the-art science into their curriculum for the first time—especially in urban and rural environments where the appropriate tools and support may not be as readily available. That is where we hope you can help!

What Can You Do to Help?

1. Take a few minutes to explore the demonstration page we created for the NIH Curriculum Supplements, http://science.education.nih.gov/demos. It features one supplement for elementary school, one for middle school, and two for high school. Each will take you no more than 5 to 10 minutes and will show you how different the approach of the supplements is from what you probably experienced in grades K-12. If you like the samples, tell your child's science teacher or school principal about the free *NIH Curriculum Supplements Series* and how well the lessons portray the scientific process. Better yet, find the supplement that is closest to your research. Offer to assist the teacher with that supplement by giving a demonstration related to one of the activities or serving as the teacher's "personal science resource" while he/she works through the lesson plans.
2. Read over the new guide *Scientists in Science Education*. The guide was written by scientists and educators to help you—whether you are considering devoting an hour to a local "career day" or a hundred hours to reviewing your state's science education standards. It has some simple suggestions for making the most of your time. It includes some references if you would like a deeper understanding of the performance of U.S. students, the importance of "inquiry" in modern science education, the roles of national and state science education standards, and the No Child Left Behind Act.

Thank you for all you are doing to advance medical science today and to ensure the vitality of the American scientific enterprise in the years to come. Please let me know if you have any comments on this Desk-to-Desk or on NIH's science education efforts. I am especially interested in hearing about your own experiences in promoting science education in your community—using the NIH curriculum supplements or however else you choose to get involved.

Please contact Bruce Fuchs, director of the NIH Office of Science Education, if you have questions about our science education efforts or if you need help with the science education projects you are considering (bruce.fuchs@nih.gov).

We look forward to hearing from you soon.

I invite you to share any comments you have with me, directly, at zerhounidirect@nih.gov.

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For information about NIH programs, useful health information, and additional resources, see the NIH web site at www.nih.gov. An archive of the Director's Newsletter is available at http://www.nih.gov/about/director/newsletter/archive.htm.

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