



John E. Burris is president of the Burroughs Wellcome Fund, Research Triangle Park, NC. E-mail: jburris@bwfund.org.

## It's the Teachers

THE POOR PERFORMANCE OF U.S. STUDENTS ON INTERNATIONAL MEASURES OF SCIENCE AND MATH has been bemoaned by everyone from the president to concerned parents. The first Trends in International Mathematics and Science Study (TIMSS) results were released in 1995 and the first Program for International Student Assessment (PISA) test results in 2000. The education reforms that they helped to motivate have had little impact on U.S. performance, and the country continues to hope for a simple solution that will miraculously turn the tide. But there are no quick fixes in the world of education. Instead, the United States must commit to the laborious task of improving the teachers we train and the environment in which they teach, while providing teachers with a respect and trust commensurate with their critical societal roles.

The U.S. education system has methods at its disposal to improve science and math education, such as inquiry-based learning, collaborative problem-solving, and exciting and timely curricula. But no approach can be successfully sustained without bright, well-prepared, and well-supported teachers. Finland has scored near the top of the PISA examinations for the past decade, and the lessons of its success are simple: Recruit the best and the brightest to be teachers, and train them extensively and well.\* Give them the freedom to develop teaching skills, independence from centralized authority, and ample time to prepare lessons and to interact with peers and students outside the classroom. And as I discovered on a recent visit there, Finland acknowledges the central role of teachers in society, as demonstrated by the respect accorded teachers and the high demand of young people to be teachers, despite salaries at the national average.

This approach is radically different from what happens in the United States, where the brightest are often not recruited into teacher education. Many U.S. colleges and universities provide substandard training, focused on methods classes to the exclusion of rigorous education in the disciplines that many will teach. Future teachers are educated only through the bachelor's degree level, in contrast to Finland, where all teachers must have a master's degree. Unlike Finnish teachers, U.S. teachers are on the treadmill of teaching to endless standardized tests, and there is little recognition of the importance of time spent with peers or participating in professional development. Most importantly, society does not give teachers the respect they deserve as professionals.

So what should the United States and other nations struggling with similar problems do? It took Finland decades to change its learning environment. Every change was initially opposed, but it now has one of the best educational systems in the world. The United States can start by raising the bar for acceptance into teacher education (Finland accepts only about 1 in 10 applicants for teacher training). We must also rigorously train teachers not only in pedagogy but in subject matter. Much of the high turnover rate of U.S. math and science teachers is due to inadequate professional development and limited classroom autonomy,† so in addition to improving training, it is critical to change the work environment in schools.

The United States is a large, diverse country, and a federal mandate to implement such changes is impractical and unrealistic. But many states have centralized funding and certification practices. States can close down underperforming teacher training and certification programs, reduce standardized testing, and recognize excellence in teaching, just as they now help to ensure quality textbooks and curricula.

As Finland has shown, the answer to the problem that beleaguers many nations is a straightforward commitment to both value and trust the most important part of any successful educational system—the teacher.

— John E. Burris

10.1126/science.1218159

\*P. Sahlberg, *Finnish Lessons* (Teachers College Press, New York, 2011).

†R. Ingersoll, H. May, *The Magnitude, Destinations and Determinants of Mathematics and Science Teacher Turnover* (Consortium for Policy Research in Education, University of Pennsylvania, Philadelphia, 2010).

