



**Marcus A. Winters**

## **Stemming the Tide**

*Let's pay science and math teachers more.*

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The Trends in International Mathematics and Science Study, an international test of fourth- and eighth-grade student achievement, recently released its latest results. As in prior years, the mean U.S. scores were roughly on par with those in most developed nations in Europe, though well below those in Asia. But students in other developed nations far outpaced U.S. students in top-level science scores. For instance, only 10 percent of American eighth-graders performed at the highest level in science, placing the U.S. 11th among the tested nations and well behind countries such as England (17 percent), Japan (17 percent), and Singapore (an astounding 32 percent).

It's no surprise, then, that the U.S. also lags the world in the proportion of students earning a college degree in technical fields. According to the National Science Foundation, only about 17 percent of U.S. college graduates earned a degree in subjects related to science, technology, engineering, or mathematics (STEM for short). That's well below the world average of 26 percent. We trail not only economic competitors such as China (52 percent), India (24 percent), Japan (64 percent), and Russia (33 percent), but even Mexico (25 percent) and the nations of the Middle East (24 percent). These figures become even more disturbing when we consider that American colleges grant many of their STEM-related degrees to foreign students, the majority of whom go back home.

American schools simply don't produce the scientists and engineers whom we need to remain competitive in a technology-driven world. In their excellent recent book *The Race Between Education and Technology*, Harvard University economists Claudia Goldin and Lawrence Katz convincingly show that the economic and political dominance of the U.S. throughout the twentieth century was based on its better-educated workforce, which could create and swiftly adapt to new technologies. But we've been losing that edge since our educational attainment began to stagnate in the mid-1970s—and as more nations surpass us in education, they also chip away at our economic dominance.

The troubles in STEM education mirror the broader problems of American K–12 education. The primary issue—and our best chance to make improvements—concerns teacher quality. A wide body of research has consistently identified teacher quality as the most important means within a school's control to improve student learning. That likely goes double for STEM subjects, which require instructors not only to be knowledgeable but also to be able to convey difficult technical information in a graspable way. Attracting such people to STEM teaching requires a compensation system that recognizes their talents. Unfortunately, though, the way we pay public-school teachers today—based exclusively on seniority and number of advanced degrees held—doesn't work.

Research consistently finds that these two attributes have little or nothing to do with teachers' actual ability to improve student learning. Paying the same salaries to teachers of widely varying effectiveness is inefficient, to say the least. But another big problem with the current pay system, especially when it comes to STEM teaching, is that it compensates teachers in different subjects equally, too, and this ignores labor-market realities. With the same number of years in the classroom and the same number of advanced degrees, a high school gym teacher earns the same salary as a high school chemistry teacher.

A better system would pay STEM teachers more than their counterparts. After all, the skills required to teach

STEM subjects are often more valuable in the broader labor market than those required to teach most other subjects. Of course, not every good math teacher would make a good engineer, and vice versa. But an individual with math and technology skills has more attractive job opportunities than, say, someone with the skills to teach elementary-level reading. The bottom line: public schools must dig deeper into the labor skill pool, hiring STEM teachers of lower quality than teachers in other subjects.

A system of differential teacher pay, on the other hand, could not only attract new teachers from the outside labor market, but also encourage the current crop of teacher talent to move into STEM subjects, which they're currently shunning for understandable reasons—the coursework required to become a teacher in a non-technical subject is much less demanding than what's necessary for STEM subjects. We need to give these people a financial motive to take the more difficult STEM path. Teachers' unions support increasing the pay of STEM teachers—so long as the pay of all other teachers goes up as well. But spreading dollars around equally means giving small increases to all teachers instead of large pay increases to those we most need.

We can still ensure that this century will be as much an American Century as the last—but only if we address our students' performance gap in math and science. And the best way to do that is to incentivize more teachers to master the hard stuff.

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