

Volume 10 Special Supplement

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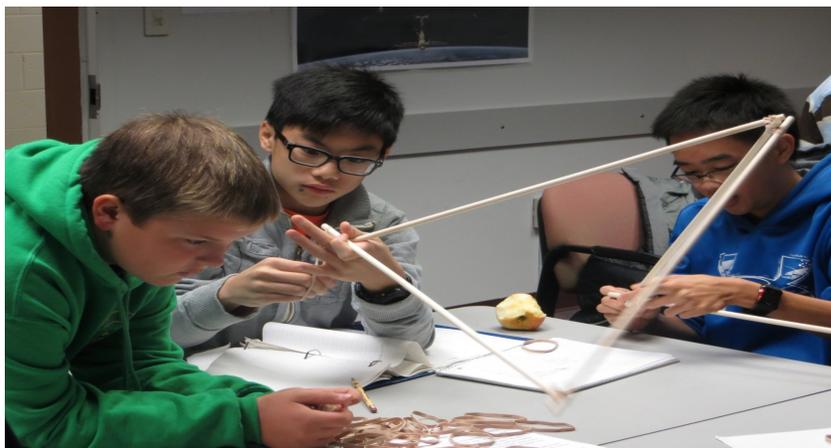
Friends

Sometimes when a project is complete and you begin to receive reactions, you might think of more you could have built in or said.

This was the case on our last issues. So we share this lagniappe with you.

Lawrence P King, Publisher

STEM NEWS CHRONICLE



Education Supplement 2021

Because of the nexus between our newsletter ([Volume 10 Issue 2, June 2021](#)) and our White Paper ([The Gender and Racial Gap at The Front of Classroom, Aug. 17, 2021](#)), we viewed the need to provide these additional thoughts on education and teaching important.

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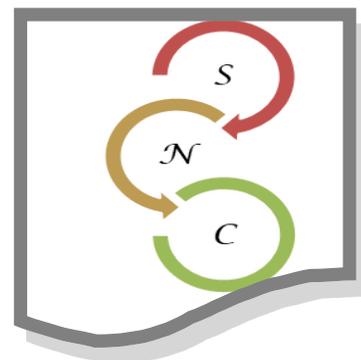
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STEM NEWS CHRONICLE™



Teaching math and bringing more gender and race diversity into classrooms is essential. But improved teaching of math is an imperative.



First, and most obvious, is the deplorable state of our K-12 math education system. Far too few American public-school children are prepared for careers in science, technology, engineering, and mathematics (STEM).

The disparity falls more heavily on the Black and Brown students whether in the UK or Kalamazoo.

Americans lack the basic skills in math and reading required for successful participation in the economy. 14/15-year-olds' academic performance in reading, math, and science again shows American students lagging behind

their counterparts in Europe and East Asia, raising difficult questions on how best to deploy the country's educational resources. The Program for International Student Assessment, or PISA, exam results comparing 600,000 students across 79 countries placed the U.S. about average in reading (eighth overall) and science (11th), but below average (30th) in math.

The extension of failure like this is revealed in the relative success US students have in admissions to science and engineering tracks in college and in graduation statistics.

This leaves the systems of economic growth supporting our way of life at risk. We are increasingly becoming dependent on a constant inflow of foreign talent, especially from mainland China, Taiwan, South Korea, and India. In a 2015 survey conducted by the Council of Graduate Schools and the Graduate Record Examinations Board, about 55 percent of all participating graduate students in mathematics, computer sciences, and engineering at US schools were found to be foreign nationals.

The National Foundation for American Policy estimated that international students accounted for 81 percent of full-time graduate students in electrical engineering at U.S. universities; and 79 percent of full-time graduate students in computer science.

The dependency has long term consequences for national security and global competitiveness given the increased investment in science by our competitors. According to the National Science Foundation, jobs in the physical sciences, engineering, mathematics, and computer sciences align with some of the highest areas of job growth in the global economy. Teaching, especially in math, the bedrock of science is essential.



Teaching

Most Americans have taken high school mathematics, including geometry and algebra, yet a national survey found that 82 percent of adults could not compute the cost of a carpet when told its dimensions and square-yard price. What's needed is a different kind of proficiency, one that is hardly taught at all, numeracy or the affinity with reading and writing.

Sadly, research still points to a profound gap between the knowledge and skills most students learn in school, and the knowledge and skills they need in typical 21st Century communities and workplaces.

(Taking Teacher Education Back to the Future! White Paper 03)



There are numerous underlying factors that help explain these failures and general math anxiety. One obvious problem lies in the way teachers are trained. Many K-12 math teachers in the United States are graduates of programs that teach little in the way of substantive mathematics beyond so-called math methods courses (which focus on such topics as “understanding the complexities of diverse, multiple-ability classrooms”).

Students learn math best when they approach the subject as something they enjoy. Speed pressure, timed testing and blind memorization pose high hurdles in the pursuit of math, according to Jo Boaler, professor of mathematics education at Stanford Graduate School of Education and lead author on a new working paper called "Fluency Without Fear. There is a common and damaging misconception in mathematics – the idea that strong math students are fast math students," said Boaler, also cofounder of YouCubed at Stanford, which aims to inspire and empower math educators by making accessible in the most practical way the latest research on math learning.

Math facts are fundamental assumptions about math, such as the times tables ($2 \times 2 = 4$), for example. Still, the expectation of rote memorization continues in classrooms and households across the United States. While research shows that knowledge of math facts is important, Boaler says the best way for students to know math facts is by using them regularly and developing understanding of numerical relations (numeracy).

For those not yet enrolled as a Premium Subscriber, we urge you to take advantage and sign up so our continuing White Paper series and additional content will be available to you. <https://snchronicle.com/premium-membership-benefits/>

Publishers Tip

What I learned long ago remains true today. Engage the students. Whether teaching Scientific Method vs. Engineering Design, get the kids involved hands on to the max. Early in a science fair project, it can be helpful to think about pursuing answering a question using the scientific method, or if you are problem solving with engineering design. The answer will influence your project from your research plan to student enthusiasm, to arriving at the end with an experience to build more adventures in science/math learning.

Continue to provide us comment and feedback on any of our newsletter or White Paper issues.