

# VITAL SIGNS

Reports on the condition of STEM learning in the U.S.



## WHY THE STATE VITAL SIGNS MATTER

The push for higher standards in K-12 education has been underway for the better part of two decades. While some states have created clearer and more rigorous academic standards, many have lowered the bar on state tests. The result? Too many parents and their children are lulled into a false sense of security at a time when all students need a stronger foundation in math and science to thrive in a global economy. Change the Equation (CTEq) has created *Vital Signs* reports on the condition of STEM learning in all 50 states and the District of Columbia. This brief offers an overview of the reports and major findings.

### Correcting the Record on Student Proficiency

The stories that many states tell about student proficiency just don't add up. While states report that the lion's share of their students are meeting their state academic standards in math, the *Vital Signs* reports tell a different story. The results of the National Assessment of Educational Progress (NAEP), which sets a consistent bar for student performance for all states—rates only 38 percent of 4th graders and 33 percent of 8th graders proficient or advanced in math. Moreover, the data show that many 4th and 8th graders seldom carry out or write about science projects, that many math teachers lack a major or minor in math, and that few students take challenging Advanced Placement tests or make it through college.

### Celebrating the Good News

But there is also good news. Some states, like Massachusetts and Missouri, have maintained high expectations for their students. Others, like Michigan, New York, Oregon and Tennessee, have recently raised the passing scores on their state math tests. And now 43 states have joined forces to create a common set of clear and demanding academic content standards in English and math. All of those states

have also joined consortia to create tests that align with those standards. This progress is a testament to the hard work and courage of educators and state leaders across the country. Similar work is underway in science.

### Challenges Down the Road

But real challenges lie ahead. If states implement standards and tests that reflect truly high expectations, then they will have to brace themselves for a sudden drop in student pass rates and steel themselves against outside pressure to lower standards. Without an honest accounting of how students are actually doing in math and science, it will be all but impossible to identify and address students' needs with strategies that work. With these *Vital Signs* reports, CTEq aims to provide that honest accounting. In addition, CTEq CEOs have pledged to stand beside state leaders as they uphold the need for high standards across the board. Many will also use the reports to ensure that their philanthropy and advocacy for STEM learning have real impact.

### What We Don't Know Can Hurt Us

This will not be our last round of *Vital Signs* reports. The current set of reports compile data from an array of public sources. Yet there is still much we do not know. For instance, we have no reliable state-by-state data on how 12th-graders are doing in science, and very little in math. We also don't know what state policies are most effective in improving STEM learning, or even what kinds of STEM activities are available to students outside of schools. Going forward, Change the Equation will assemble a new and more robust set of *Vital Signs* reports with the most complete data on STEM learning ever assembled. The reports will give the policymakers—and the public—key information on where the states are making gains, where they have work to do, and how they can prepare many more students to thrive in a global economy. In the meantime, we offer these *Vital Signs* reports as an important first guidepost in our common work to improve STEM learning for every child.



Improving teaching and learning in science, technology, engineering and mathematics (STEM)

# MAJOR FINDINGS

## Most States Set A Low Bar for Success

Across the nation, only 38 percent of U.S. 4th graders were proficient or advanced in math in 2009. Yet states, on average, reported proficiency rates that were a full 37 percentage points higher. A handful of states have broken ranks by setting truly high expectations in their state tests. In Massachusetts, for example, fewer students were proficient on the state test than on NAEP.

## Change Is Possible: The Nation Has Made Real Progress in 4th and 8th Grade Math

NAEP “scale scores” which give states a way to track trends in student performance have risen in math over the past 15 years.

- Scores in 4th grade math rose 16 points between 1996 and 2009. Gains among black and Hispanic students were larger over the same period: 23 and 22 points, respectively.
- Some states or jurisdictions saw bigger gains than others. For example, Hispanic 4th graders gained 38 points in Delaware, Hispanic 8th graders gained 39 points in the District of Columbia, and white 8th graders gained 21 points in Massachusetts.

Similar data are not available in science, because the NAEP science tests were revised in 2009, making comparisons with prior years impossible.

## Achievement Gaps Remain Large and Widespread

In math, gaps separating White students from their Black and Hispanic peers narrowed substantially between 1973 and 1990. But they have barely budged since then, and some states with the highest overall achievement in math and science also have the widest gaps. Massachusetts, for example, has the highest overall percentage of 4th graders proficient in science: 46 percent. But this figure masks enormous gaps. While 53 percent of White students are proficient, only 15 percent of Hispanic students and 12 percent of Black students are. States need to ensure that their policies target the diverse learning needs of all students, especially those who face the biggest hurdles, without diluting expectations.

## For Most Students, College Is More Dream than Reality

While the U.S. faces a shortage of 3 million college-educated workers by 2018, relatively low percentages of students attend and graduate from college:

- Nationwide, only 10 percent of the class of 2010 took an AP test in math, and 10 percent took an AP test in science. Students who take and pass an AP test are significantly more likely to graduate from college than academically similar students who do not take a test.
- Although 94 percent of high school students say they plan to attend a two- or four-year college, only 36 percent of all 18- to 24-year-olds are actually enrolled in a post-secondary institution.
- Students who begin college programs often do not finish. Nationally, only 28 percent of students who begin an associate's degree program receive a certificate or associate's degree within three years. Only 56 percent of students who enroll in bachelor's degree programs receive a degree within six years.
- College graduation rates vary widely from one state to the next. For example, the six-year graduation rate for bachelor's candidates ranges from 22 percent to 69 percent.

## Elementary and Middle School Teachers Need a Stronger Grounding in Math

Math teachers should have a strong academic background in math, yet many U.S. students lack access to such teachers:

- Only 57 percent of the nation's 8th graders have teachers with a major or minor in math.
- Most states set passing scores on content licensure tests for elementary teachers well below the mean for all test takers.

## About Half of 4th and 8th Graders Say They “Never or Hardly Ever” Write About Science Projects

All students should carry out and reflect on engaging science projects, yet many U.S. 4th and 8th graders say they hardly ever do:

- Fifty-four percent of the nation's 4th graders and 47 percent of its 8th graders report that they “never or hardly ever” write reports about science projects. Thirty-nine percent of 8th graders report that they “never or hardly ever” design a science experiment.
- Results vary by state. In some states, as many as 60 percent of 8th graders say they “never or hardly ever” write reports about a science project. In Connecticut, by contrast, 30 percent do.

For copies of our state-by-state *Vital Signs* reports and information on the sources of these data, please visit [www.changetheequation.org/vitalsigns](http://www.changetheequation.org/vitalsigns).



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