VITALSIGNS

MINNESOTA

Business leaders in Minnesota have sounded an alarm. They cannot find the science, technology, engineering and mathematics (STEM) talent they need to stay competitive. Students' lagging performance in K–12 is a critical reason why.

Minnesota has long been known for setting a high bar in math and science, and its young people, on average, outscore their peers in most other states on national tests of math and science. Students have also made some gains in math since 2003.

Yet this success masks large racial, ethnic and income-based gaps in student achievement and access to opportunity. Not enough students—least of all minorities—have the chance to learn rich and challenging content that prepares them for college and careers. Black and Hispanic students also receive a disproportionately small share of STEM degrees and certificates awarded in the state.

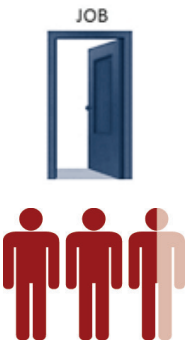
To its credit, Minnesota gets a stronger return on its investment in math and science education than other states do. Smarter investments will be critical as business leaders work with educators and state leaders to tackle new reforms in lean times.

STEM SKILLS ARE IN DEMAND

In Minnesota, STEM skills have stayed in demand even through the economic downturn.

STEM:
2.4 jobs for every
1 unemployed person

Non-STEM:
2.7 unemployed people for every **1 job**



CAN MINNESOTA MEET THE DEMAND FOR STEM SKILLS?

Students have made real academic strides in most states, but no state is on track to getting all students the STEM skills they need to succeed in college and careers. Low-income and minority students lag farthest behind.

Students have improved in math

Since 2003, eighth graders in Minnesota have made some gains on the National Assessment of Educational Progress (NAEP), also known as "the nation's report card." Yet many still have far to go to reach a score of 299, NAEP's cutoff for "Proficient" performance.

8th Grade NAEP scale scores, 2003 & 2011

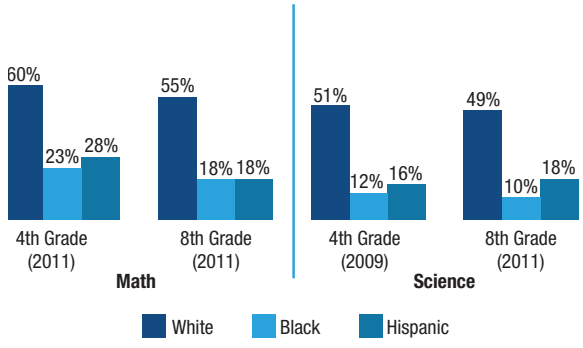
	NAEP Scale Score		Change Since 2003	
	2003	2011	MN	Most Improved State
All	291	295	**+4**	+17 (DC)
Low Income	271	276	**+5**	+19 (MA)
White	295	302	**+6**	+17 (HI)
Black	251	266	**+15**	+19 (NJ)
Hispanic	262	270	**+7**	+24 (AR)

Totals may not sum due to rounding errors.

Closing achievement gaps must remain a priority

No state has closed the persistent achievement gaps among racial and ethnic groups.

Percentage of students scoring at or above proficient in math and science, 2009 & 2011

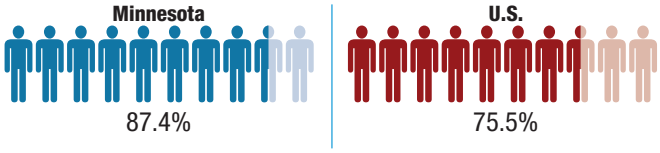


CHANGE THE EQUATION™ IN PARTNERSHIP WITH the American Institutes for Research.

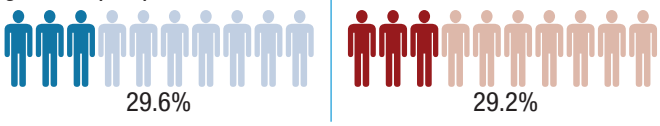
For the complete state report, methodology, and sources, visit changetheequation.org/stem-vital-signs.

Minnesota must plug gaps in the STEM pipeline from high school through college

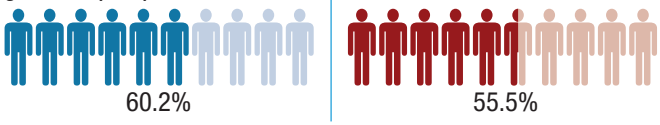
What percentage of high school students graduate? (2009)



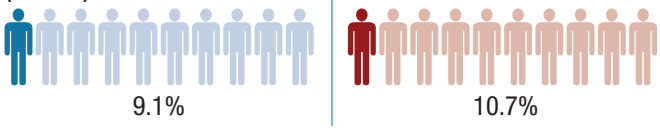
Of students who enter a two-year degree program, what percentage graduate? (2009)



Of students who enter a four-year degree program, what percentage graduate? (2009)



What percentage of college degrees and certificates are in STEM fields? (2008–09)



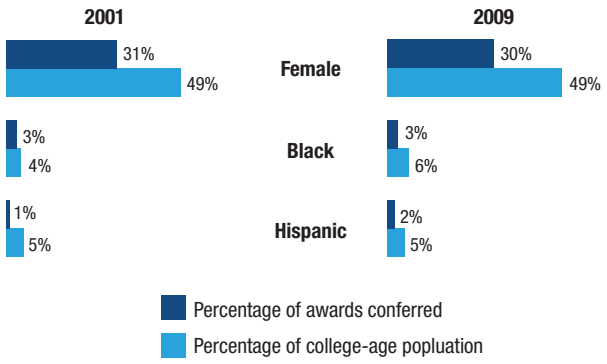
No student should need remediation

47% of Minnesota's first-time community college students who just graduated from high school need remediation in math, which costs the state **$32,736,976** each year.

Women and minorities are too critical a resource to remain untapped

Women and minorities are a very large share of the population but they earn just a small share of STEM degrees and certificates.

Percentage of degrees/certificates conferred in STEM fields in Minnesota



WILL MINNESOTA STAND FIRM ON HIGH EXPECTATIONS?

Setting high expectations is a critical step toward raising student performance in STEM.

Minnesota is showing a commitment to high expectations

Minnesota opted not to join the **45 other states that adopted Common Core State Standards** in math, yet Minnesota's own math standards have been generally well regarded, earning a "B" from the Thomas B. Fordham Foundation, for example, for clarity and rigor.

Math tests should set a high bar

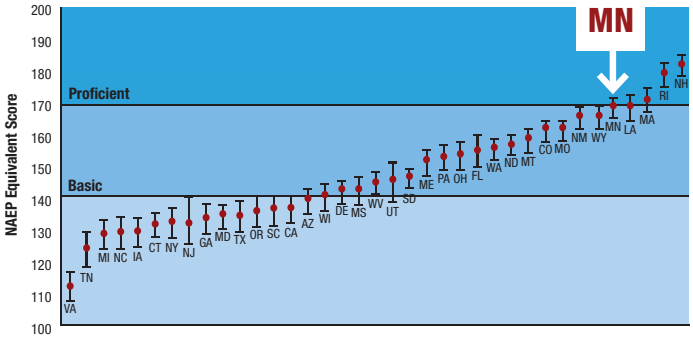
Minnesota plans to revise its math assessments by spring 2013. The state currently sets the threshold for proficiency in its 4th- and 8th-grade tests higher than most states do, though it is still lower than the National Assessment of Educational Progress's bar for "Basic" performance.

Science is the next frontier for better standards and higher expectations

Twenty-six states, including Minnesota, are collaborating on common **"Next Generation" content standards in science,** which they aim to complete in 2013. If these standards meet a high bar, Minnesota should adopt them or standards as rigorous.

To its credit, the state sets a very high bar on its 8th-grade science test. In 2009, Minnesota was one of very few states to set the passing score on that test near NAEP's high bar for "Proficient" performance.

NAEP scale equivalents of grade 8 science standards for proficient performance, by state, 2009



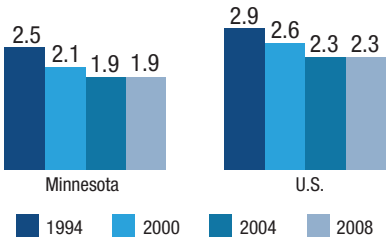
ARE STUDENTS EXPOSED TO CHALLENGING AND ENGAGING CONTENT?

Lack of access to such content severely limits young people's college and career prospects.

Building a strong foundation in science takes time

Time for science in Minnesota elementary schools has fallen since 1994.

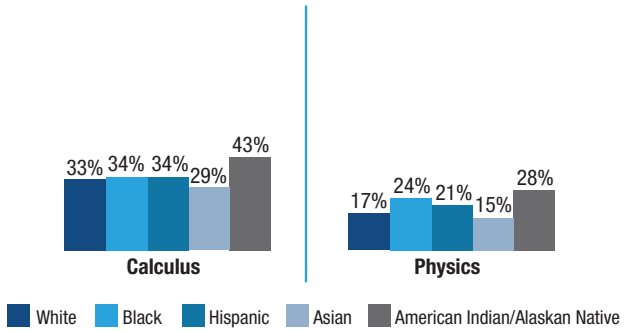
Hours per week spent on science in grades 1–4, 1994–2008

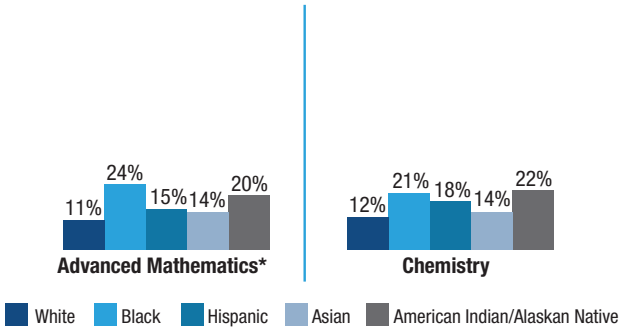


Students of all backgrounds need access to challenging math and science courses

Nationwide, many minority students lack access to such courses.

Percentage of students in schools that do not offer challenging math and science courses, by race/ethnicity, 2009





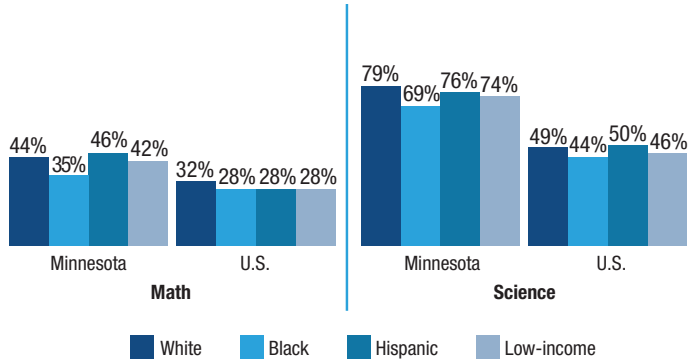
** Includes trigonometry, elementary analysis, analytic geometry, statistics, and precalculus*

ARE TEACHERS PREPARED TO TEACH TO HIGH STANDARDS?

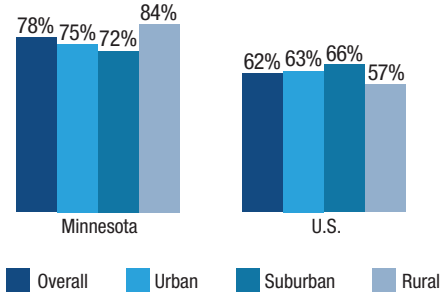
Research shows that teachers' content knowledge and teaching experience can affect student performance.

Teachers need deep content knowledge

8th graders whose teachers have an undergraduate major in the subject they teach, 2011



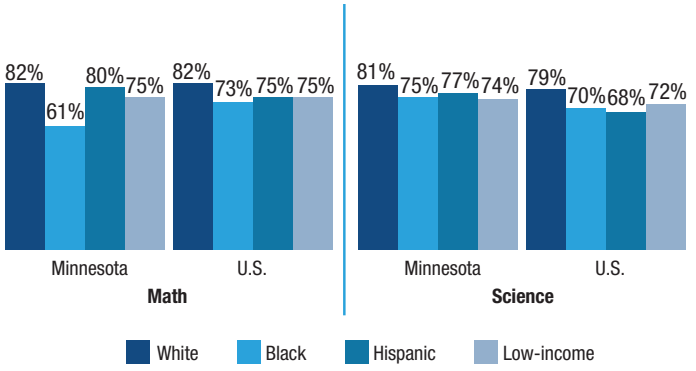
8th graders whose science teachers took three or more advanced science courses in college, 2011



High-need schools need to retain excellent teachers

In most states, minority and low-income students are more likely to have inexperienced teachers, indicating high turnover rates.

8th graders whose teachers have 5+ years of experience teaching their subject, 2011



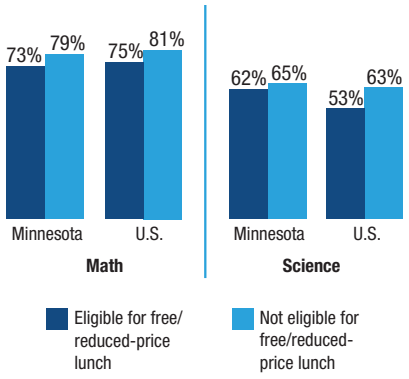
** Reporting standards not met.*

For the complete state report, methodology, and sources, visit changetheequation.org/stem-vital-signs.

DO SCHOOLS AND TEACHERS IN MINNESOTA HAVE WHAT THEY NEED TO SUCCEED?

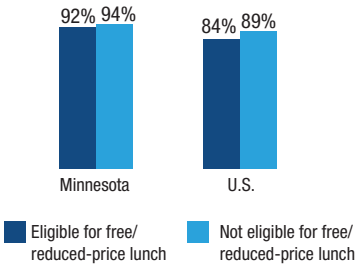
Teachers need the tools of their trade

8th graders whose teachers say they have all or most of the resources they need, by income, 2011



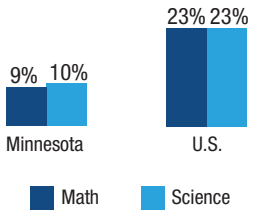
All students need access to science facilities and supplies

8th graders whose schools have science labs, by income, 2011



Parent support and engagement are critical to student success

Teachers who say lack of support is a serious problem, 2011



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RECOMMENDATIONS

Impatience is a virtue when it takes data and real solutions as its guides. The time to act is now. These Vital Signs provide business, education, state and policy leaders with an extensive and reliable set of indicators to promote STEM learning and high expectations for all students. We've crunched the numbers to offer insights into much-needed actions that can be undertaken right away with resolve.

Make science count

Unlike most states, Minnesota sets a high bar for passing its 8th-grade science test. The state should also begin holding schools accountable for their students' performance on its science tests. Now it only holds schools accountable for meeting student performance targets in reading and math tests. When there are no consequences for science achievement, schools can easily give science short shrift.

Ease the transition between high school and college

Minnesota students should understand the requirements for college admission and whether their high school classes are preparing them for college-level work. Unfortunately, too many Minnesota students attend schools that don't even offer higher-level courses like calculus and physics. The state should expand access to such courses. For example, the state could strengthen initiatives that help schools boost participation in AP courses, especially among women and minorities.

Attend to achievement gaps

Minnesota continues to struggle with very large racial, ethnic and income-based achiemement gaps in math and science. There is also evidence that the state's minority and low-income students have less access to educational opportunities, such as rigorous coursework, qualified teachers who feel well supported and other educational resources. Minnesota should ensure that its policies offer extra support to the students who need it most—while continuing to hold those students to a high bar.