# STEM EDUCATION IN THE U.S.: Where We Are and What We Can Do | 2017

ACT®

# Introduction

## It's difficult to admit, but the United States is a STEM-deficient nation.

And as difficult as it is to make that statement, ACT has been saying it for some time. We've been here before, saying the same things. Let's review.

**FACT:** Workers in the STEM fields (science, technology, engineering, and mathematics) are in high demand.[1]

**FACT:** The number of STEM occupations in the U.S. will grow by 8.9 percent between 2014 and 2024.[2]

**FACT:** Policymakers at all levels of government are emphasizing the importance of educating students for STEM-related jobs, including federal Department of Education grant prioritization to STEM-related proposals.[3]

### But there is a problem.

**FACT:** According to ACT data, not enough U.S. students are equipped for STEM opportunities—now or in the future.

ACT has the only nationally recognized college readiness assessment that includes a separate, dedicated science test, and a STEM Benchmark score reflecting students' readiness for credit-bearing first-year college coursework in STEM subjects. As such, we are well versed in the state of students' STEM achievement—and the current state is cause for serious concern. The data points highlighted in this report demonstrate this.

It's not that the condition of STEM education isn't well known. In fact, in a recent survey, nearly three-quarters of U.S. adults say that the quality of STEM education in the U.S. is no better than average, compared with its counterpart in other countries.[4]

### But what to do about it?

As in past reports, in this report we offer recommendations for policymakers and educators. ACT's previous STEM reports have contributed much-needed data to the national conversation around the importance of STEM to our country's education and training systems.

But contributing to a conversation, however well intentioned, is not enough. Solutions are needed, now. So in addition to highlighting the most critical data points, this year's STEM report identifies a number of themes *within* the data that demand special attention. We've also looked to see if other groups had identified the same stress points.

### The good news?

Some groups have, and are taking action. In addition to presenting data, policy-related findings, and recommendations, this report also recognizes and celebrates important work that is already taking place across the nation to address many of the numerous issues presenting specific obstacles to students' preparation for STEM majors and careers.

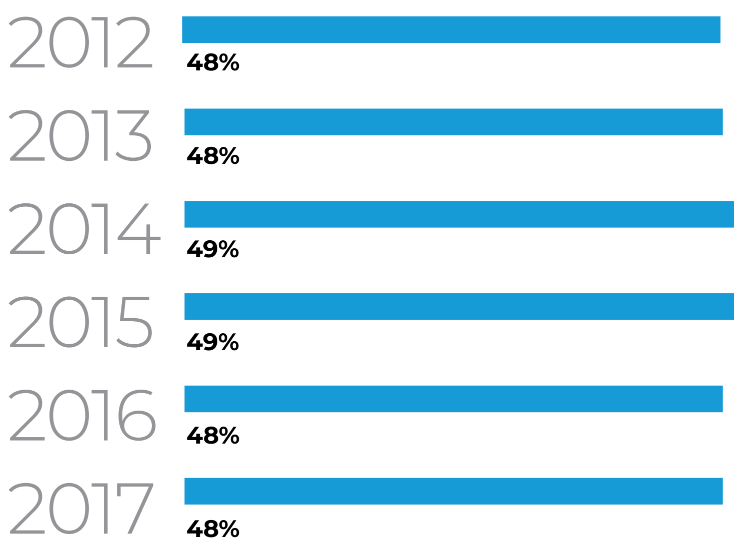
The findings and examples highlighted in this report conclude with recommendations of next steps toward improving STEM achievement and expanding opportunities to increase students' readiness to pursue and succeed in STEM-related careers.

# Finding 1

## STEM interest and achievement in the U.S. have changed little in the past five years.

Nearly half (48 percent) of ACT-tested 2017 high school graduates had an expressed and/or measured interest in STEM (see sidebar) *(Figure 1).*

***Figure 1.*** Percentages of ACT-tested high school graduates interested in STEM, 2012–2017




## Key Terms

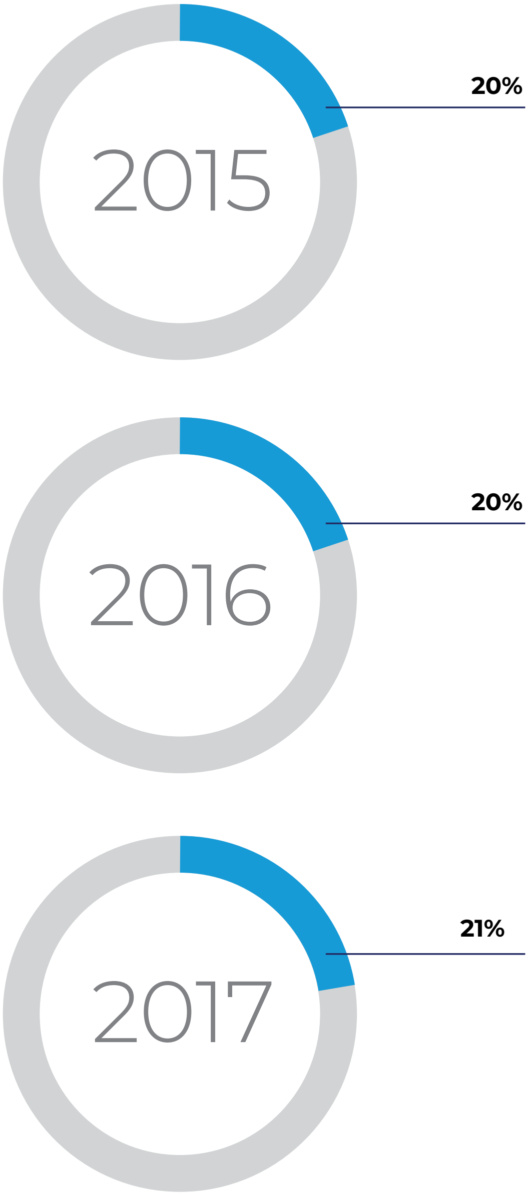
**How ACT defines STEM:** When individuals register for the ACT, they are asked to choose, from a list of 294 titles, both a college major and an occupation that they plan to enter after high school. Classification of ACT titles as STEM titles was conducted by an expert panel with knowledge of labor market trends and postsecondary academic programs, which identified 93 of the ACT titles as STEM-related. Panel decisions were informed by three sources of information: (1) STEM-designated occupations from the US Bureau of Labor Statistics (BLS), (2) STEM-designated degree programs from US Immigration and Customs Enforcement (ICE), and (3) ACT Interest Inventory score profiles for students planning to enter the major/occupation.

**Expressed interest in STEM:** Students who choose a STEM major or occupation when registering for the ACT (e.g., ecology, statistics, veterinary medicine, architecture) are considered to have an *expressed* interest in STEM.

**Measured interest in STEM:** When individuals register for the ACT, they are also asked to complete the ACT Interest Inventory, a research-validated survey that presents students with sets of three work-relevant activities (e.g., build a picture frame, conduct a meeting, help settle an argument) and asks them to identify their preferred activity in each set. The responses are converted to scores in six different educational and occupational fields. Students whose highest score is in Science, or in Technology with their second-highest score in Science, are considered to have a *measured* interest in STEM.

The percentage of ACT-tested 2017 high school graduates meeting the ACT STEM Benchmark (see sidebar) was 21, a slight increase over the preceding two years *(Figure 2)*.

***Figure 2.*** Percentages of ACT-tested high school graduates meeting the ACT STEM Benchmark, 2015–2017




# Key Terms:

## ACT STEM Benchmark

The ACT STEM Benchmark of 26, derived from the ACT math and science scores, represents the level of readiness students need to have a 50 percent chance of earning a B or higher and about a 75 percent chance of earning a C or higher in typical first-year college STEM courses (e.g., calculus, biology, chemistry, and physics). The ACT STEM Benchmark is based on ACT research indicating that academic readiness for students pursuing a STEM major may require higher scores than the current ACT College Readiness Benchmarks in math and science.[5] ACT research also shows that, for STEM majors, STEM scores are positively related not only to succeeding in individual math and science courses but also to earning a cumulative grade point average of 3.0 or higher, persisting in their STEM major, and earning a STEM-related bachelor's degree.[6]

## Promising Practices:
## *Statewide STEM initiatives*

In an effort to increase students' interest in STEM-related fields and the number of STEM-ready students across the nation, a number of state-level initiatives have been implemented to expand STEM awareness and STEM education, in order to improve STEM outcomes. While still in their infancy, these programs are already demonstrating a positive effect. For example:

- Initiated in 2011, **Iowa**'s Governor's STEM Advisory Council convenes leaders from higher education, preK–12 education, business, and government to promote STEM interest and achievement throughout the state. One council initiative, the STEM Scale-Up Program, shows that participating students score an average of three percentile points higher on the Iowa Assessments in mathematics and reading, and four percentile points higher in science, compared to all students statewide; for minority students, the gains were even stronger.[7]

- In **New Jersey**, the public-private partnership Governor's STEM Scholars Program, which creates enrichment opportunities for STEM students from high school through PhD programs, is having positive personal and educational impacts on participants.[8]

- **Washington**'s multisector STEM Education Innovation Alliance aligns the state's education and career training systems with the workforce needs of Washington's technology-driven economy. So far, the alliance has shown substantial improvements in STEM awareness, interest, achievement, and degree completion among students in the state.[9]

***"STEM-based industries such as computer science, aerospace, agriculture, clean energy, life sciences and advanced manufacturing are the backbone of our state's innovation economy. But we can't take these industries for granted. We need to make sure our education system is keeping students ahead of the curve and providing employers access to a world-class workforce."***

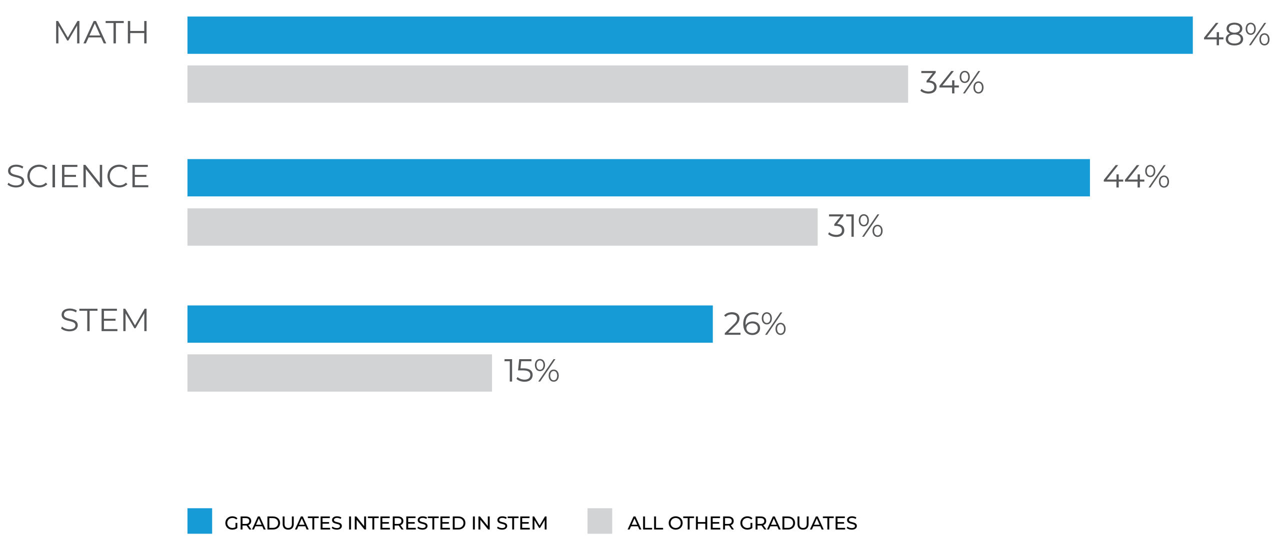
***—JAY INSLEE, GOVERNOR, STATE OF WASHINGTON***

# Finding 2

## Expressed or measured interest in STEM is associated with higher levels of college readiness in STEM-related subjects.

Of the nearly 50 percent of students with either an expressed or measured interest in STEM, these students show higher levels of college readiness in STEM subject areas—11 to 14 percentage points higher—than ACT-tested high school graduates generally *(Figure 3)*.

***Figure 3.*** Percentages of ACT-tested 2017 high school graduates meeting ACT Benchmarks in Math, Science, and STEM, by STEM interest



## Promising Practices:
## *Texas Instruments, CGI, and GEAR UP*

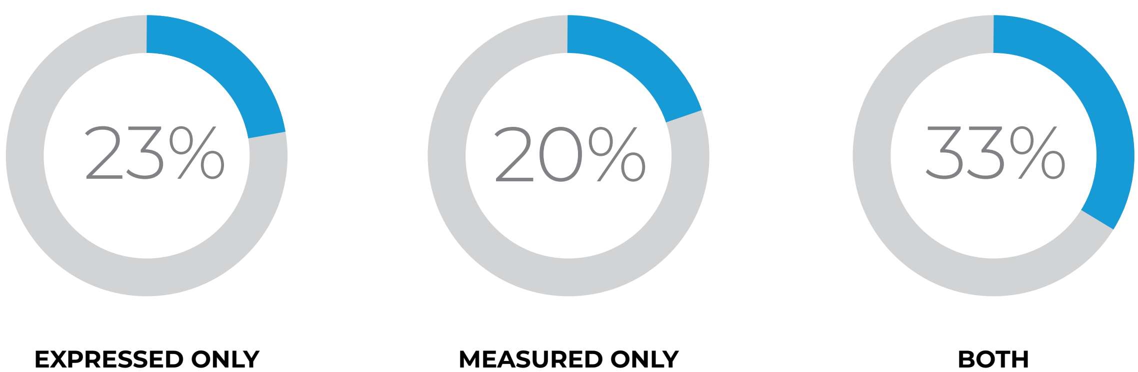
As a way to inspire or increase student interest in STEM-related subjects that they find interesting but may not have considered as career pathways, **Texas Instruments** (TI) and **CGI** partnered with the Lafayette Parish School System's **GEAR UP** program (designed to increase the number of low-income students who are prepared to enter and succeed in postsecondary education) to develop after-school coding clubs for its participating high school students. By providing equipment and mentors to these students, both in the coding clubs and in summer camps, TI and CGI are investing in innovative ways to increase the number of students who have access to technology experiences in high school and who then continue into STEM fields in higher education.

# Finding 3

## Expressed or measured interest in STEM is associated with higher levels of college readiness in STEM-related subjects; however, college readiness in STEM is even higher among students with both an expressed **and** a measured interest in STEM.

Students demonstrating only one type of STEM interest, either expressed or measured, fall short in terms of STEM Benchmark attainment when compared to peers who have both expressed **and** measured interest.[10] Twenty-three percent of students who had only an expressed STEM interest met the ACT STEM Benchmark, and the comparable percentage among students with only a measured interest was 20. But the percentage of students with both kinds of interest who met the STEM Benchmark was 33—10 and 13 percentage points higher, respectively, than either of the other groups.

***Figure 4.*** Percentages of ACT-tested 2017 high school graduates who met the ACT STEM Benchmark, by STEM interest type



## Promising Practices:
## *Idaho STEM Action Center*

Idaho is an example of a state trying to clarify connections between students' facility in STEM-related subjects and STEM-related careers. The **Idaho STEM Action Center** created a strategic plan, with accompanying legislation, to engage industry partners for the purpose of increasing student access and achievement, teacher professional development, and STEM pathways in college and careers. This investment in STEM education and training includes specific goals and benchmarks such as creating an online portal of resources and best practices, supporting community STEM events, and targeting grants to traditionally underrepresented populations. The statewide effort employs discrete measurements of success to measure its ability to increase interest in STEM, among other goals such as helping students understand the link between STEM-related coursework and the skills needed for STEM-related occupations. Since its inception, the center has funded more than 80 grant applications for initiatives such as professional training, curriculum development, STEM events, and distribution of technology devices.

# Finding 4

## The nation's STEM education and teacher pipeline signals challenges ahead.

Very few ACT-tested graduates—only 5,839 of the 970,532 STEM-interested students in the U.S., or just over one-half of one percent—planned to major or pursue a career in math or science education *(Figure 5)*.

Research shows the critical importance of teachers in impacting student outcomes in later life.[11] STEM access and opportunities in high school rely on high-quality instruction, but with only .17% and .43% of STEM-interested students indicating plans to pursue science or math education, respectively, our STEM teacher pipeline—and therefore future students' readiness to pursue STEM-related fields—is in jeopardy.

***Figure 5.*** Percentages of ACT-tested 2017 high school graduates with an interest in STEM who plan to pursue a college major or occupation in math education or science education

0.43%

**MATH EDUCATION**

0.17%

**SCIENCE EDUCATION**

## Promising Practices:
## *100Kin10*

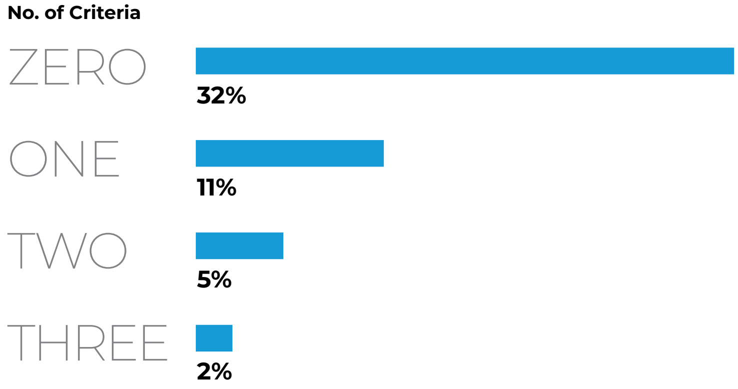
**100Kin10** recognizes that because the future health of the U.S. economy hinges in large part on our education system's ability to prepare students for STEM careers, we need to do a better job of increasing and strengthening the supply of STEM educators. Thus, 100Kin10 aims to raise the number of STEM teachers nationwide through partnerships with schools, businesses, nonprofits, and government agencies designed to address three stress points in the STEM educator pipeline: recruitment, training, and retention.[12] Formed in 2011, in its first four years 100Kin10 has recruited and trained more than 30,000 new STEM teachers, providing them with high-quality content knowledge, skills, and strategies that enable them to persist in their careers. This puts the organization well on track to fulfilling its mission of adding 100,000 STEM teachers to the national pool by 2021.

# Finding 5

## Underserved students are at a huge STEM disadvantage.

Underserved learners (see sidebar) lag far behind their peers in the area of STEM preparedness. Thirty-two percent of ACT-tested students who meet none of the defining criteria for underserved met the STEM Benchmark, compared to just 11 percent of those meeting one criterion, 5 percent of those meeting two criteria, and 2 percent of those meeting all three criteria—meaning that, on average, first-generation college students who are from a racial/ethnic minority group and a low-income family are *sixteen times less likely* to be ready for credit-bearing STEM coursework in college than the group of students who are not considered underserved.

***Figure 6.*** Percentages of ACT-tested 2017 high school graduates who met the ACT STEM Benchmark, by number of "underserved" criteria met




## Key Terms

**How ACT defines underserved learners:** ACT identifies underserved learners using student characteristics that are often related to a lack of access to high-quality educational and career planning opportunities and resources. Specifically, this definition encompasses students who have at least one of the following characteristics:

- **Minority:** race/ethnicity is African American, American Indian/Alaska Native, Hispanic/Latino, or Native Hawaiian/other Pacific Islander
- **Low income:** combined parental income is less than or equal to $36,000
- **First generation in college:** highest parental education level is high school diploma or less

## Promising Practices:
## *Full Option Science System*

Key to increasing underserved students' engagement and achievement in STEM is a teacher corps that is likely to understand their specific challenges and needs and which can serve as role models for entry into STEM careers among historically underserved groups. To help remedy this, **Full Option Science System** (FOSS) trains African American, Hispanic, and Native Hawaiian/Pacific Islander science teachers in a research-based, hands-on science curriculum for grades K–8 that provides students with a strong science foundation for more advanced pursuit of science topics in later grades.[13] Studies of FOSS have shown, for example, that students using the FOSS curriculum had higher science test scores[14] or met science standards in higher percentages[15] than did students not using FOSS.

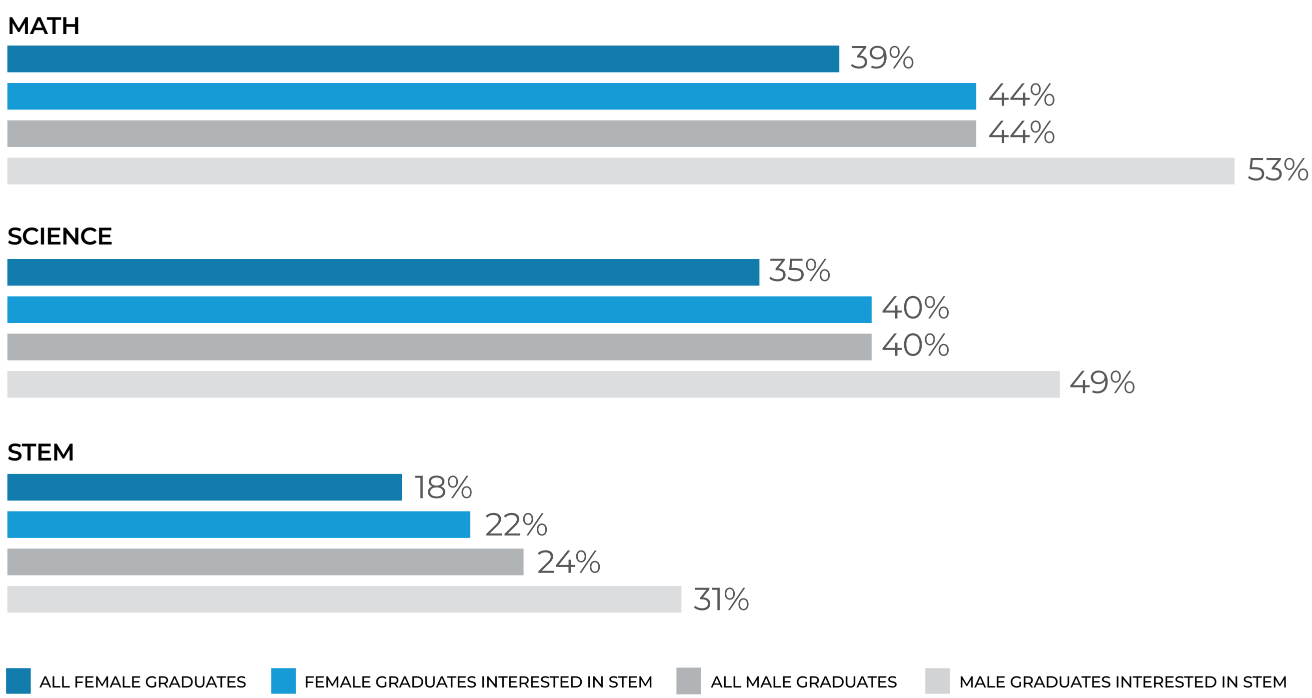
# Finding 6

## Gender gaps in STEM continue.

Efforts are slowly taking hold to reverse the persistent and inaccurate perception that STEM fields are of interest only to men: nearly as high a proportion of ACT-tested 2017 female graduates (47 percent) as male graduates (50 percent) had an expressed and/or measured interest in STEM. For female graduates, this represents an increase of 1 percentage point since 2015—a period during which the overall proportion of students interested in STEM in the total ACT-tested population decreased by the same percentage *(see Figure 1 in finding 1 above)*.

However, we continue to see females fall behind males in STEM-related attainment. This is true both for graduates generally and for graduates interested in STEM. What's more, the achievement gap between females and males is actually wider among graduates interested in STEM than among all graduates—4 percentage points wider for the Math and Science Benchmarks and 3 percentage points wider for the STEM Benchmark.

***Figure 7.*** Percentages of ACT-tested 2017 high school graduates meeting selected ACT College Readiness Benchmarks, by gender and by interest in STEM



Although women make up nearly half the U.S. workforce (and half the college-educated workforce), they hold fewer than 25 percent of U.S. STEM jobs; part of the reason for this is that women with STEM degrees are less likely than their male counterparts to work in a STEM field.[16] Moreover, studies show that female STEM students in typically male-dominated majors are more likely to change majors (relative to their male peers) in response to low grades.[17] To ensure equal representation as well as to make sure that the U.S. has enough STEM workers for the demands of the future economy, it is essential that girls and young women see STEM professions as a promising path for their future, and that they have the ability to succeed in these fields. It is important, however, to ensure that programs encouraging girls and young women to participate in STEM programs do not backfire by overemphasizing stereotypes even in their efforts to overcome them.

## Promising Practices:
## *Girl Scouts of the United States; Iowa BIG*

To mitigate the STEM gender gap, **Girl Scouts of the United States of America** has introduced several programs to increase STEM participation and engagement among girls and young women. These programs, which reach over 160,000 Girl Scouts annually, include such initiatives as the Imagine Your STEM Future program. This program brings girls into contact with STEM professionals and college students, allowing them to see themselves studying and ultimately working in a STEM field. Participants were more likely to feel that STEM professionals make a difference in the world and saw an increased confidence in their science and/or math abilities.[18]

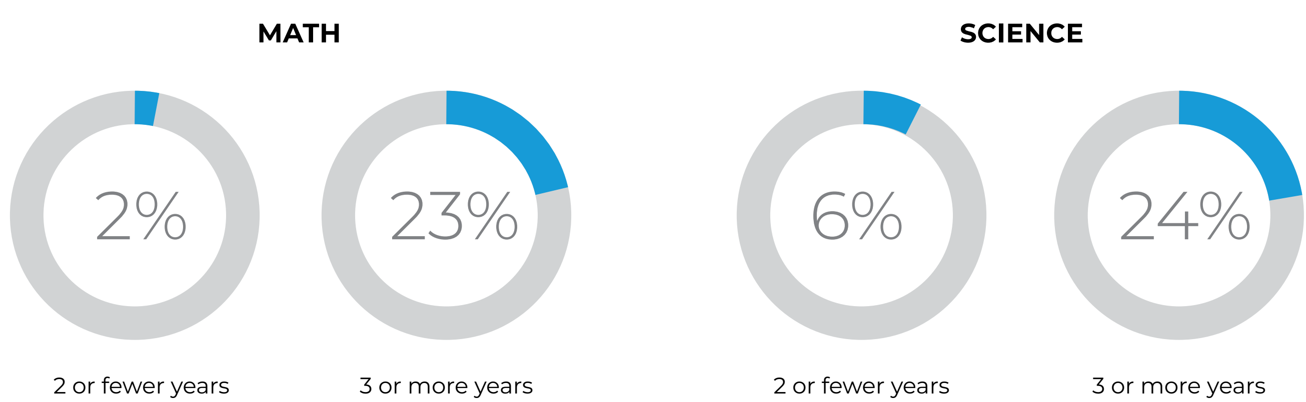
**Iowa BIG** schools in Cedar Rapids, Iowa, sponsor "She Can," an event that offers female students in sixth and seventh grades the opportunity to explore ideas for solving urgent problems. Participants are mentored by female high-school students and present real-world solutions to local experts to be acted upon.

# Finding 7

## Students need access to core STEM courses.

ACT research has shown that taking rigorous science courses, including physics, in high school is vital to college readiness.[19] The results are clear: almost a quarter of students taking at least three years of math or science met the STEM Benchmark, while only 2 to 6 percent of those who took no more than two years of math or science did so—a fourfold difference in science and more than an elevenfold difference in math. However, in 2015, fewer than 50 percent of high-poverty high schools offered any physics courses, and only just over 25 percent of high-poverty high schools offered courses in computer science.[20]

***Figure 8.*** Percentages of ACT-tested 2017 high school graduates who met the ACT STEM Benchmark, by number of years of math and science coursework taken in high school



## Promising Practices:
## *Programs that help students access STEM coursework*

- The **SAM Academy**, of Fresno, California, shows students from low-income communities the practical applications of STEM concepts with its "lab on wheels," equipped with internet connections, computers, and science (as well as art and music) equipment, that visits schools and libraries in communities largely made up of migrant farm workers and their families.[21]

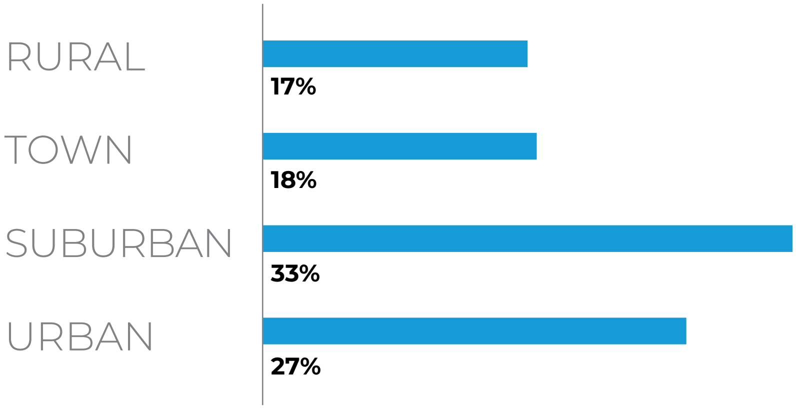
- The **Pathways in Technology Early College High School** (P-TECH) at the New York City College of Technology pairs technology-interested high school students from varied academic or socioeconomic backgrounds with mentors from IBM or other regional corporations. Unlike most of their peers, P-TECH graduates have earned enough credits to qualify for an associate's degree at no cost as well as a track record of real-world, work-based experience in addressing real problems and challenges. As an added incentive, P-TECH graduates are given special consideration when applying for jobs at IBM.[22]

# Finding 8

## Geographic differences exist in STEM achievement.

The data show that, among STEM-interested students, 17 percent of students in rural high schools and 18 percent of students in town-located high schools meet the ACT STEM Benchmark, versus 33 percent of students in suburban high schools and 27 percent of students in urban high schools.

***Figure 9.*** Percentages of ACT-tested 2017 high school graduates interested in STEM who met the ACT STEM Benchmark, by location of high school




## Key Terms

**Locale Classifications from the National Center for Education Statistics**

ACT uses the National Center for Education Statistics (NCES) framework for locales, composed of four general types:[23]

- **Urban:** territory inside an "urbanized area" (where the population is greater than 50,000) as well as a "principal city" (an incorporated location with a large population in a metropolitan area).
- **Suburban:** territory inside an "urbanized area" (where the population is greater than 50,000) but outside of a "principal city."
- **Town:** territory inside an "urban cluster" (where the population is between 2,500 and 50,000).
- **Rural:** Census-defined rural territory that is outside of both "urban clusters" and "urbanized areas."

## Promising Practices:
## *The Education Development Center*

Several programs around the country have been designed and implemented to increase rural students' exposure to STEM content and technology and their achievement in STEM-related subjects. **The Education Development Center** (EDC), a national education policy and research organization headquartered in Boston, has been involved collaboratively with several such programs. One, a partnership with teachers in Maine that uses interactive mobile technology to enhance elementary school students' mathematics learning, is showing positive effects on both pedagogy and student engagement; the partnership recently received funding from the state department of education to expand from one school to 23. A second project in Maine, the Maine Mathematics and Science Alliance, is connecting rural students with rich afterschool STEM learning experiences by means of a resource bank containing enrichment experiences offered by, for example, local technology, aquaculture, and forestry companies, shipyards, farms, and 4-H clubs.[24]

# Policy Recommendations

The data points and examples highlighted in this report lead to the following recommendations for next steps:

## 1. Ensure that state graduation requirements emphasize the importance of rigorous science and math courses for all students.

As the report findings display, an opportunity gap exists in the U.S. education system. One way to expand opportunities in STEM for all students is to require high schools to offer, and students to take, rigorous science and math courses. Since ACT's publication of *Crisis at the Core* in 2004, ACT has advocated that all U.S. students take a rigorous core curriculum, defined as four years of English; three years of mathematics, including rigorous courses in Algebra I, Geometry, and Algebra II; three years of science, including rigorous courses in Biology, Chemistry, and Physics; and three years of social studies.

At a time when success in a modernized workforce almost always requires some sort of postsecondary credential or degree, the increasing importance of STEM to the American economy makes this core curriculum more essential than ever. Yet not a single state required the full ACT-recommended core curriculum for graduation from high school in 2017. However, 11 states did fully meet our recommendations for math, and one (Oklahoma) fully met the science recommendation (see Appendix).

We pledge to work with states to enact higher graduation requirements that support the increased readiness of all students—and especially STEM students—to meet the challenging coursework necessary in postsecondary education and the careers they'll enter after high school.

**ACT'S CHALLENGE TO STATES BY THE END OF 2022:**

Double the number of states requiring all high school students to take three rigorous mathematics courses and three rigorous science courses.

## 2. Pay teachers more.

Teachers deserve to be compensated as the credentialed and dedicated professionals they are—or that we want and expect them to be. Identifying and training future teachers is also a systemic issue that needs to be supported by increased teacher salaries in order to attract the best and brightest students to the field. When the wage disparity in the U.S. is such that the starting salary for electrical engineering jobs is almost $62,500 but the average starting salary for a high school math or science teacher is less than $39,000, finding ways to attract students into STEM teaching positions becomes increasingly difficult.[25]

In 2011, the Organisation for Economic Co-operation and Development (OECD) released *Building a High Quality Teaching Profession: Lessons from Around the World*, which analyzed how high-performing countries have built a high-quality, effective, and professional teacher workforce.[26] The report found that the U.S. ranked 22nd out of 27 countries in average earnings for teachers, and that, whereas in many other countries the average teacher salary ranges from 80 to 100 percent of what the average college-educated worker earns, in the U.S. the proportion is only 60 percent.

Federal and state funding must be increased to enable districts to pay higher teacher salaries, especially in critically important areas such as advanced math (Algebra II, Calculus, etc.) and science (Advanced Biology, Chemistry, and Physics). It's long past time to put our money where our mouth is.

**ACT'S CHALLENGE TO STATES BY THE END OF 2022:**

Increase teacher starting salaries by a minimum of 10% per year with additional stipends and/or bonuses to attract math, engineering, and science majors that make teaching STEM courses competitive with entry-level engineering salaries.

## 3. Establish a loan forgiveness program for STEM teachers.

STEM teachers deserve to be compensated on a par with similarly credentialed and dedicated professionals, but despite repeated calls for greater pay equity a sizeable wage gap remains. As mentioned in recommendation 2 above, a substantial gap exists between the average starting salaries for a high school math or science teacher on the one hand and an electrical engineer on the other. What other incentives can be offered to attract and retain college graduates with STEM credentials and an interest in teaching? One solution may be a federally-matched loan forgiveness program exclusively for STEM teachers.

Forty-five states and the District of Columbia already offer state-based student loan repayment assistance programs designed to induce potential teachers into areas or programs where there are shortages. But unlike these programs, a loan forgiveness program for STEM teachers need not require a certain number of consecutive years of teaching in a low-income school or district or a certain number of qualifying monthly loan payments while working for a qualifying public employer. Instead, such a program could forgive, at the end of each year of full-time teaching, the average yearly debt the teacher had accumulated while acquiring their degrees. This would allow program participants to see a monetary benefit much sooner, thus alleviating some of the sting from the initial wage gap.

**ACT'S CHALLENGE TO THE FEDERAL GOVERNMENT BY THE END OF 2022:**

Create and financially support a federally-matched loan forgiveness program to improve the pipeline of STEM teachers.

## 4. Provide equitable access to both high-quality math and science courses and real-world work experiences for all students via dual enrollment programs.

Rigorous courses should be available to all students, not just those interested in earning an advanced STEM degree. This is critically important because labor market projections[27] point to strong growth in high- and middle-skill jobs, such as those in the healthcare professional and support services, financial operations, and computer and mathematical science fields. These occupations require more than a high school diploma but often less than a four-year STEM degree.

Entry into these occupations can be accelerated via high-quality dual enrollment programs through partnerships with local community colleges, four-year institutions, and business and industry. ACT uses the term "dual enrollment" to encompass early college high school, dual credit, and concurrent enrollment programs, but regardless of the name all of these models allow students to earn college credit while still in high school. Research has demonstrated that students who earn postsecondary credits while simultaneously completing their high school diploma stay more engaged in the classroom and graduate at higher rates than their peers, and are also more likely to continue their education after high school to complete a recognized postsecondary credential.[28]

Moreover, many dual enrollment programs in the technology and health fields (such as the P-TECH program discussed earlier in this report) are explicitly designed for—and with curricular input from—local employers. Such programs offer a unique opportunity for the business community to help better align K–12 and postsecondary education with workforce needs. States and local districts should invest in or seek public-private partnership opportunities to make access to such courses a reality for all students.

**ACT'S CHALLENGE TO STATES BY THE END OF 2022:**

Double the number of STEM-oriented public-private dual enrollment partnerships in order to provide needed—and equitable—access to STEM instruction, especially for rural and urban students who lack the access of their suburban peers.

# Appendix: Do States' Graduation Requirements for Math and Science Courses Match the ACT-Recommended Core Curriculum?[a]

| State | MATH<br>3 years, including Algebra I, Geometry, Algebra II? | SCIENCE<br>3 years, including Biology, Chemistry, Physics? |
|---|---|---|
| Alabama | Y | (2 OF THE 3 COURSES) |
| Alaska | | |
| Arizona | Y | |
| Arkansas | Y | (2 OF THE 3 COURSES) |
| California | (1 OF THE 3 COURSES) | (1 OF THE 3 COURSES) |
| Colorado | | |
| Connecticut | [b] | [c] |
| District of Columbia | Y | (1 OF THE 3 COURSES) |
| Delaware | Y | (1 OF THE 3 COURSES) |
| Florida | (2 OF THE 3 COURSES) | (1 OF THE 3 COURSES) |
| Georgia | [d] | (1 OF THE 3 COURSES) |
| Hawaii | (2 OF THE 3 COURSES) | (1 OF THE 3 COURSES) |
| Idaho | (2 OF THE 3 COURSES) | |
| Illinois | (1.5 OF THE 3 COURSES)[e] | |
| Indiana | Y[f] | (2 OF THE 3 COURSES) |
| Iowa | | |
| Kansas | | |
| Kentucky | Y | |
| Louisiana | (2 OF THE 3 COURSES) | (1 OF THE 3 COURSES) |
| Maine[g] | | |
| Maryland | (2 OF THE 3 COURSES) | (1 OF THE 3 COURSES) |
| Massachusetts[h] | | |
| Michigan | Y | (1 OF THE 3 COURSES) |
| Minnesota | Y | (2 OF THE 3 COURSES) |
| Mississippi | (1 OF THE 3 COURSES) | (1 OF THE 3 COURSES) |
| Missouri | | |
| Montana | | |
| Nebraska | | |
| Nevada | | |
| New Hampshire | (1 OF THE 3 COURSES) | (1 OF THE 3 COURSES) |
| New Jersey | (2 OF THE 3 COURSES) | |

| State | MATH<br>3 years, including Algebra I, Geometry, Algebra II? | SCIENCE<br>3 years, including Biology, Chemistry, Physics? |
|---|---|---|
| New Mexico | (1 OF THE 3 COURSES) | |
| New York | | |
| North Carolina | | (1 OF THE 3 COURSES) |
| North Dakota | | (1 OF THE 3 COURSES) |
| Ohio | (1 OF THE 3 COURSES) | |
| Oklahoma | (1 OF THE 3 COURSES)[i] | Y |
| Oregon | (1 OF THE 3 COURSES) | |
| Pennsylvania | | |
| Rhode Island | | |
| South Carolina | | |
| South Dakota | Y | (2 OF THE 3 COURSES) |
| Tennessee | Y | (2 OF THE 3 COURSES) |
| Texas | (2 OF THE 3 COURSES) | |
| Utah | [d] | |
| Vermont[j] | | |
| Virginia | (2 OF THE 3 COURSES) | |
| Washington | | |
| West Virginia | [d] | (1 OF THE 3 COURSES) |
| Wisconsin | | |
| Wyoming | | |

a. This matrix reflects state-mandated graduation requirements for the high school class of 2017 with data collected by ACT between September 2017 and January 2018, and does not reflect the requirements of individual schools and districts whose requirements may align with the ACT-recommended core curriculum in math and science.
b. Increases to four years in 2020 (Algebra I, Geometry, and either Algebra II or Probability & Statistics)
c. Increases to three years in 2020 (courses not specified)
d. Georgia, Utah, and West Virginia each require three units of integrated math which cover topics including Algebra I, Geometry, and Algebra II course content.
e. State was given half credit for requiring a course “includ[ing] geometry content”.
f. Applies to the Core 40 diploma, from which students can opt out in favor of a less stringent General diploma
g. State is in the process of updating to proficiency-based standards.
h. MassCore is a recommendation only.
i. State will meet the ACT-recommended criteria for math courses beginning in 2019.
j. State is in the process of updating to locally-developed proficiency-based standards.

# Notes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