# The Condition of STEM 2015

## Vermont

ACT®

# The Condition of STEM 2015

## Vermont

ACT has been a leader in measuring college and career readiness trends since 1959. Each August, we release *The Condition of College & Career Readiness* (**www.act.org/newsroom/data/2015**), our annual report on the progress of the ACT-tested graduating class relative to college readiness. Nationally, a record 59% of the 2015 graduating class took the ACT® test. The continued increase in the number of ACT test takers enhances the breadth and depth of our data pool, providing a comprehensive picture of the current college readiness levels of the graduating class as well as offering a glimpse of the emerging general and STEM (Science, Technology, Engineering, Math) education pipeline in the United States. It also allows us to review various aspects of the ACT-tested 2015 graduating class.

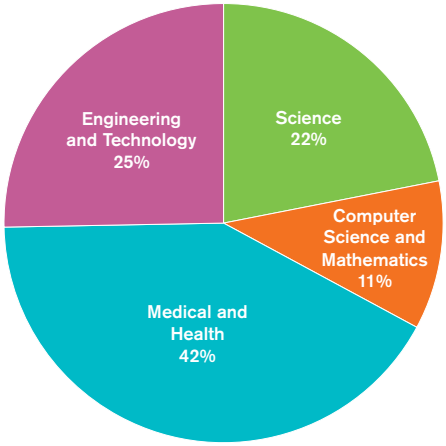
This report reviews the graduating class in the context of STEM-related fields. ACT is uniquely positioned to deliver this report for two key reasons. First is our commitment to science through the inclusion of science tests in our assessments. ACT leadership is unmatched in providing a definitive assessment in the science area. Second is the research-based ACT Interest Inventory, which is delivered with the ACT and measures students' interest in a wide range of educational and occupational fields.

With the ACT Interest Inventory, we can determine interest levels (both expressed and measured) in specific STEM fields and, more importantly, college readiness in math and science among STEM-interested students. Students with an expressed interest are those who chose a major or occupation (out of the 294 possibilities listed in the Student Profile Section of the ACT[1]) that corresponds with STEM fields. Students are designated to have a measured interest when their responses to the ACT Interest Inventory items result in high science and technology interest scores.[2]

### The ACT Definition of STEM

ACT categorized the STEM fields in our first *Condition of STEM* report (2013) to offer states the opportunity to use this report as a consistent baseline for state-level STEM initiatives. Using our list of occupations and majors, we created four key areas: **Science, Computer Science and Mathematics, Medical and Health**, and **Engineering and Technology**. This report will show achievement levels in each of those areas on a national level. In addition, the actual number and percentage of students interested in specific majors and occupations are provided. The report will assist officials in documenting success of STEM initiatives that focus on generating interest and more thoroughly preparing students for STEM fields.

### 2015 Overall STEM Interest by Category




### Our Commitment to STEM

To provide students and educators with more insight into the critical aspects of college readiness, ACT introduced a STEM score on ACT student score reports in fall 2015. This score is derived from the ACT mathematics and science scores and represents students' overall performance in these subject areas. ACT also developed a new ACT STEM College Readiness Benchmark, based on recent research indicating that academic readiness for college coursework in STEM subject areas may require higher scores than the current ACT College Readiness Benchmarks in math and science (Mattern, Radunzel, & Westrick, 2015). The ACT STEM Benchmark is described on pages 24 and 25 of this report.

In addition, ACT recently launched ACT Aspire®, an assessment system focused on grades 3–10. ACT Aspire covers the same subjects as the ACT: English, reading, math, science, and writing. To complement the information in this report, ACT has created an ACT Aspire STEM score. This score will give educators and STEM leaders an early and ongoing view of the STEM pipeline within their states.

ACT WorkKeys® and the ACT National Career Readiness Certificate™ are additional assessment tools available to students, individuals, and companies to assist in determining work readiness for STEM-related jobs.

We must work together to get more students prepared to succeed in STEM careers. This is a critical step if the United States is to remain a world leader. ACT is committed to research and assessment practices that make enhanced STEM opportunities for students a reality.

Please note that reporting achievement by combinations of student characteristics may give rise to small *N* counts. As a result, outcomes in this report should be interpreted with caution.

© 2015 by ACT, Inc. All rights reserved. The ACT® test is a registered trademark of ACT, Inc., in the USA and other countries. The ACT National Curriculum Survey®, ACT Aspire®, and ACT WorkKeys® are registered trademarks of ACT, Inc. The ACT National Career Readiness Certificate™ is a trademark of ACT, Inc.

# Key Findings

## from the National *Condition of STEM 2015* Report

This report shows that, over the past several years, about half of US high school graduates have expressed interest in STEM majors and careers. Meanwhile, college readiness levels in math and science are higher for STEM-interested students than for ACT-tested students overall (as stated in the ACT *Condition of College & Career Readiness 2015* report, released in August 2015).

This is particularly true among students with an interest that is both expressed (planning to pursue a STEM major/career) and measured (having a high ACT Interest Inventory score in STEM areas). Interest in Computer Science and Mathematics majors and occupations is trending up slightly, while interest in Medical and Health majors and occupations is trending down slightly.

Nevertheless, based on the percent meeting the new ACT STEM College Readiness Benchmark, far too many STEM-interested students are not well prepared to succeed in the type of rigorous college math and science coursework required of STEM majors. These findings echo those of the national *Condition of College & Career Readiness 2015* report, which issued a call to action to the entire education community, urging that more work should be done to improve college and career readiness for all students. We should commend the efforts of STEM councils and leaders across the country to increase awareness and interest in STEM among young people while expanding efforts to increase college and career readiness levels in STEM areas.

Among the key findings of this report:

1. **Interest in STEM remains high.** Of the more than 1.9 million graduates who took the ACT in 2015, nearly 940,000—or 49%—had an interest in STEM. This shows that STEM initiatives and the awareness created around STEM majors and careers continues to be effective. However, the challenge is to translate this interest into pursuit and completion of STEM majors.
   - Five-year trends show the percentage of students interested in Computer Science and Mathematics majors has increased by 2%, while there has been a 3% decrease in the percentage of students choosing Medical and Health majors.
   - Choices of specific majors within each area are remarkably consistent from last year.
2. **Students with STEM interest that is both expressed and measured outperformed their peers.** Consistent with previous years, students who demonstrate both an expressed and measured interest in STEM outperformed their peers in terms of college readiness. Such students had Benchmark attainment percentages that were 16 points above all ACT-tested 2015 graduates in both math and science. Because students may not be able to articulate (much less pursue) interests in STEM early in their academic careers, introducing students to STEM majors and occupations at an early age will go a long way toward planting the seeds of interest necessary to pursue those areas later on.
3. **For the first time, students are measured against the ACT STEM College Readiness Benchmark.** Through research, ACT has established a Benchmark that puts an even stronger emphasis on the need for students to use every opportunity in preparation to pursue a STEM major or occupation. The ACT STEM College Readiness Benchmark is based on more rigorous entry-level college courses than the established math and science Benchmarks, and rates of attainment are extremely low on the more strenuous ACT STEM College Readiness Benchmark. Recent ACT research noted that students meeting the STEM Benchmark have a 49% chance of attaining a STEM degree in six years, compared to only 17% of those who fall below this Benchmark.
4. **Interest in teaching STEM subject areas continues to lag.** Despite a larger number of ACT-tested students this year, which translates to a larger number of STEM-interested students, the number of 2015 graduates interested in teaching math and science was lower than in 2014. This is an alarming finding, as meeting the demand for well-prepared teachers in STEM areas is critical to the future of our country.

# Vermont STEM Report

## Attainment of College and Career Readiness

### *Overall STEM Interest*

- Between 2011 and 2015, the percent of students interested in STEM increased by 3%.

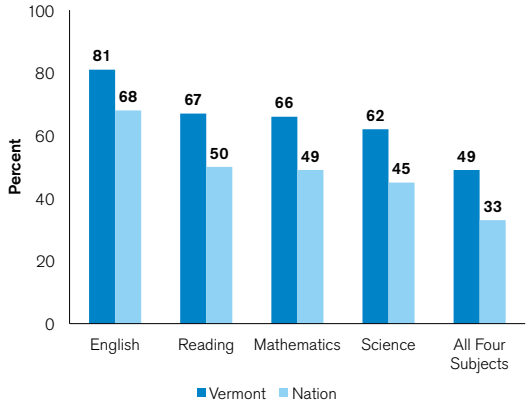
**Student STEM Interest Trends: 2011–2015, State vs. Nation**

| | | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|
| Percent | Vermont | 47% | 48% | 47% | 48% | 50% |
| | Nation | 48% | 48% | 48% | 49% | 49% |
| *N* Count | Vermont | 970 | 966 | 934 | 1,009 | 1,093 |
| | Nation | 780,541 | 804,507 | 868,194 | 899,684 | 939,049 |

### *Overall STEM Interest*

- 1,093 of your graduates have an interest in STEM.

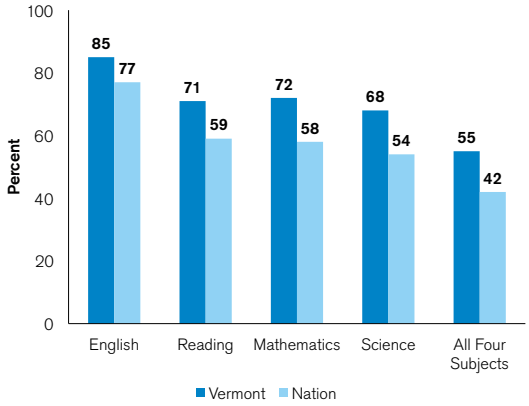
**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Subject**




### *Expressed and Measured Interest*

- 464 of your graduates have an expressed and measured interest in STEM, which is 42% of the overall interest.

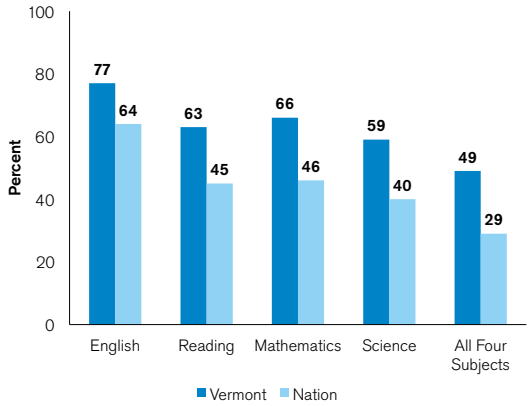
**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Subject**




### *Expressed Interest Only*

- 412 of your graduates have an expressed interest in STEM, which is 38% of the overall interest.

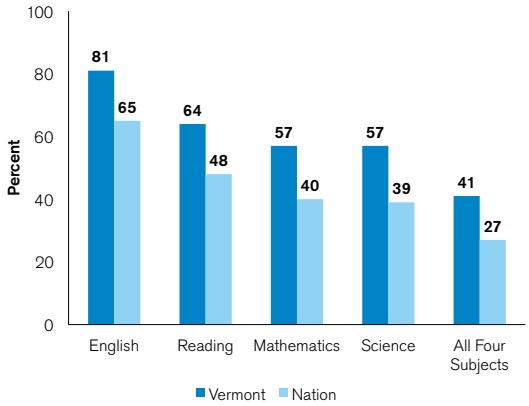
**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Subject**




### *Measured Interest Only*

- 217 of your graduates have a measured interest in STEM, which is 20% of the overall interest.

**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Subject**



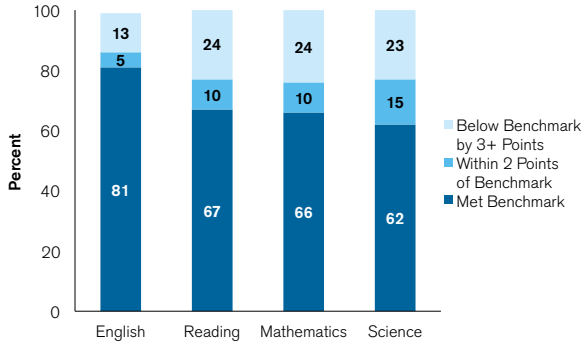

Note: Percents in this report may not sum to 100% due to rounding.

# Vermont STEM Report

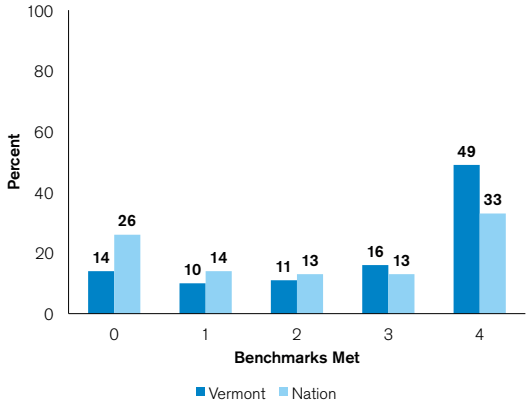
## Attainment of College and Career Readiness

### *Overall STEM Interest* (*N* = 1,093)

**Percent of 2015 ACT-Tested High School Graduates by ACT College Readiness Benchmark Attainment and Subject**

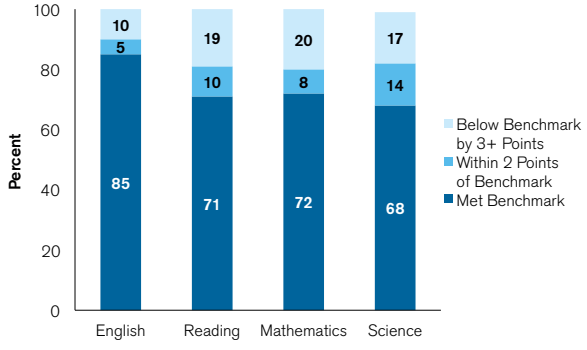



**Percent of 2015 ACT-Tested High School Graduates by Number of ACT College Readiness Benchmarks Attained**

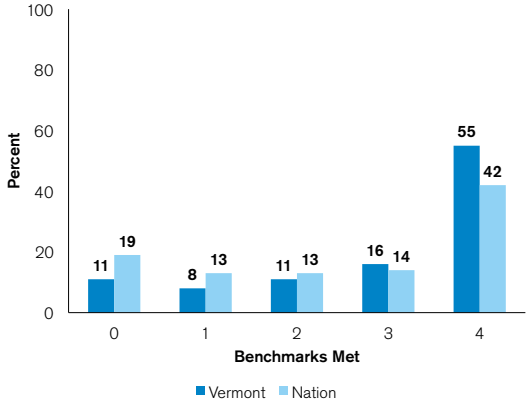



### *Expressed and Measured Interest* (*N* = 464)

**Percent of 2015 ACT-Tested High School Graduates by ACT College Readiness Benchmark Attainment and Subject**




**Percent of 2015 ACT-Tested High School Graduates by Number of ACT College Readiness Benchmarks Attained**

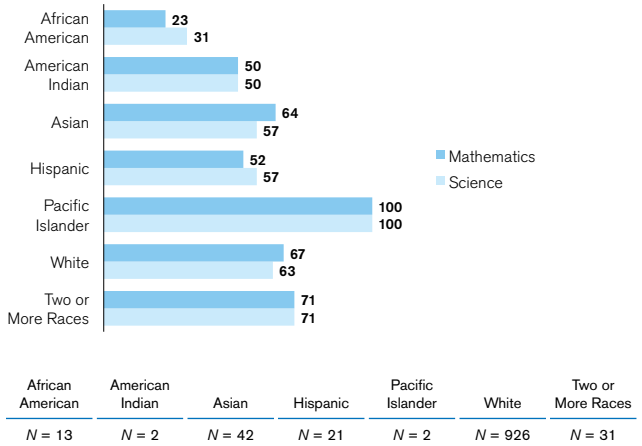


# Vermont STEM Report

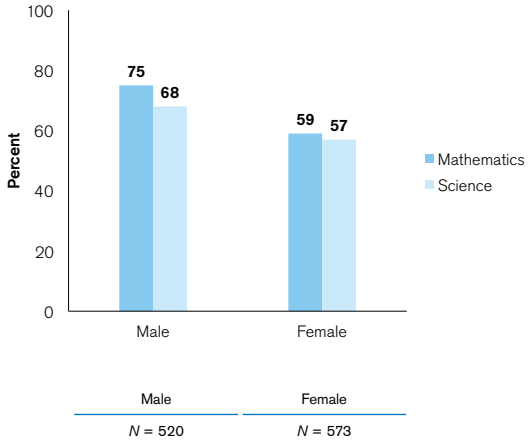
## Attainment of College and Career Readiness

### *Overall STEM Interest*

**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Race/Ethnicity and Subject***

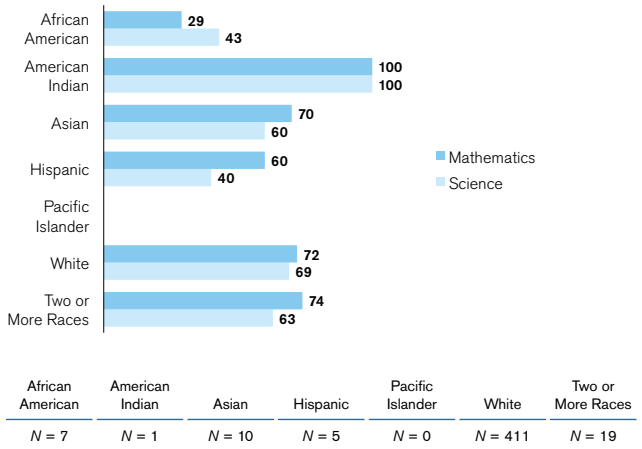



**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Gender and Subject**

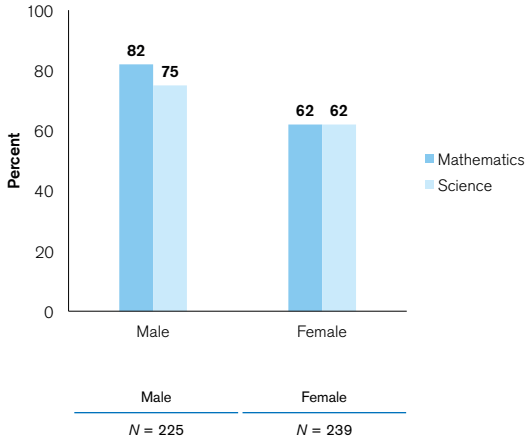



### *Expressed and Measured Interest*

**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Race/Ethnicity and Subject***




**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Gender and Subject**



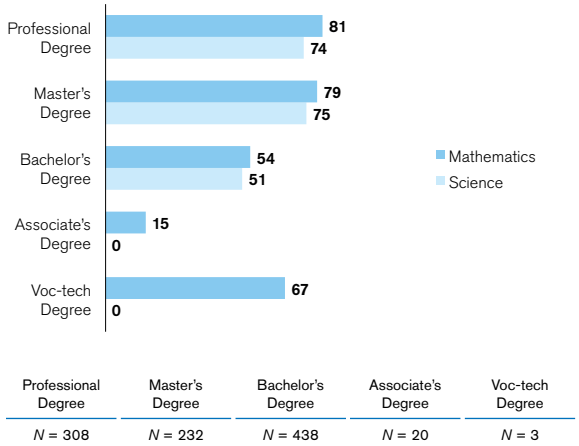

* Race/ethnicity categories changed for the 2010–2011 academic year to reflect updated US Department of Education reporting requirements.

# Vermont STEM Report

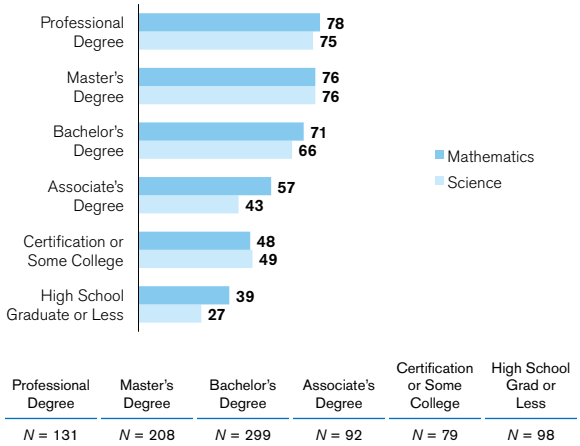
## Attainment of College and Career Readiness

### *Overall STEM Interest*

**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Educational Aspirations and Subject**

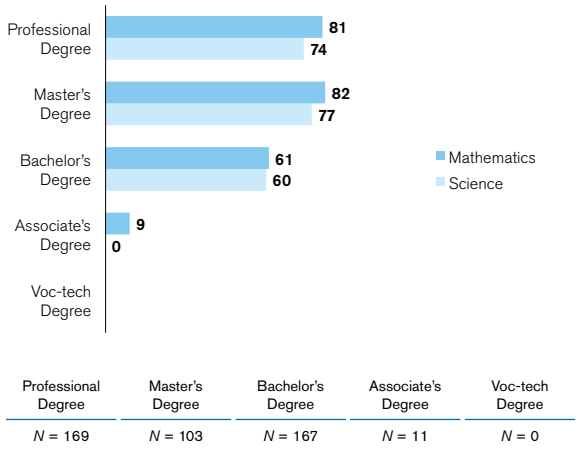



**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Highest Parental Education Level and Subject**

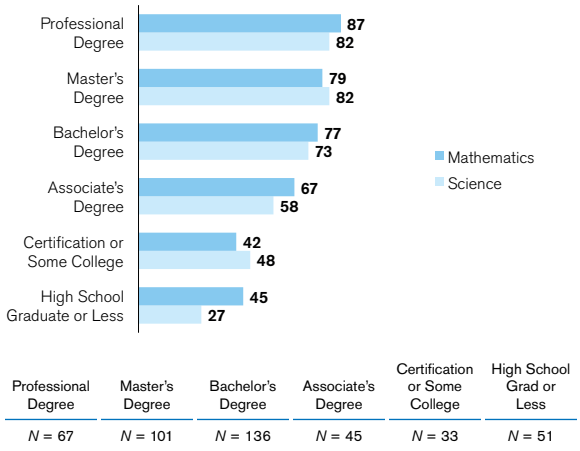



### *Expressed and Measured Interest*

**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Educational Aspirations and Subject**




**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Highest Parental Education Level and Subject**



# Science

## Majors/Occupations

### *Overall STEM Interest*

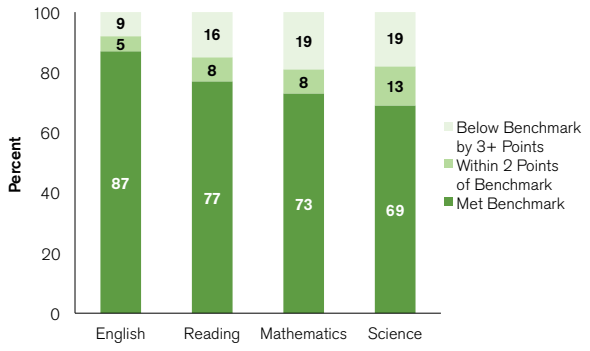
- Between 2011 and 2015, the percent of students interested in STEM decreased by 3%.

**Student STEM Interest Trends: 2011–2015, State vs. Nation**

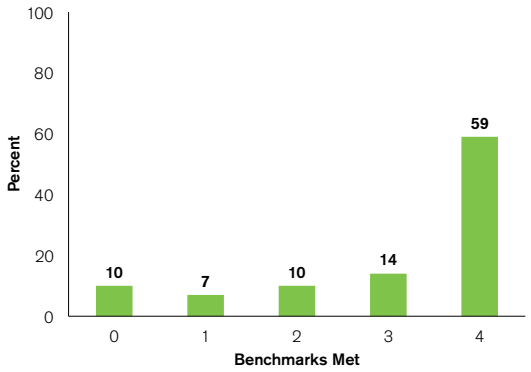
| | | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|
| Percent | Vermont | 33% | 34% | 33% | 31% | 30% |
| | Nation | 23% | 23% | 22% | 22% | 22% |
| *N* Count | Vermont | 322 | 325 | 306 | 314 | 328 |
| | Nation | 176,490 | 183,857 | 195,098 | 200,461 | 208,520 |

### *Overall STEM Interest* (*N* = 328)

**Percent of 2015 ACT-Tested High School Graduates by ACT College Readiness Benchmark Attainment and Subject**

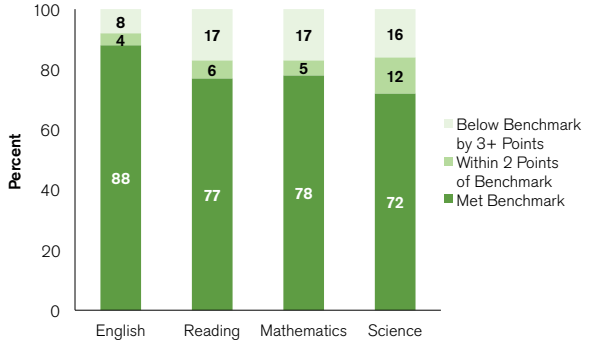



**Percent of 2015 ACT-Tested High School Graduates by Number of ACT College Readiness Benchmarks Attained**

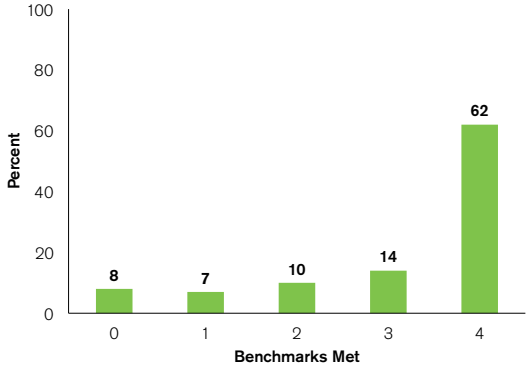



### *Expressed and Measured Interest* (*N* = 178)

**Percent of 2015 ACT-Tested High School Graduates by ACT College Readiness Benchmark Attainment and Subject**




**Percent of 2015 ACT-Tested High School Graduates by Number of ACT College Readiness Benchmarks Attained**



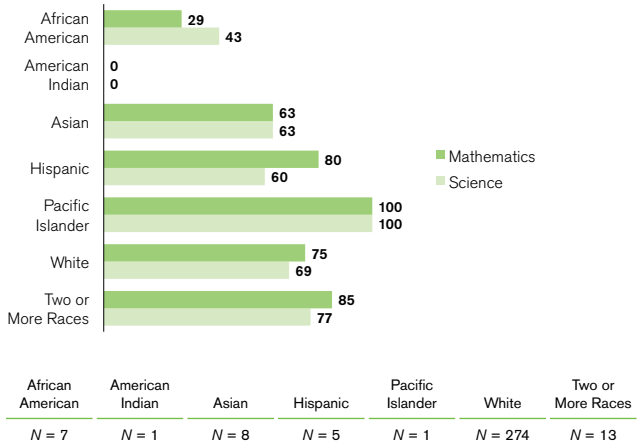

Note: Reporting achievement by combinations of student characteristics may give rise to small *N* counts. As a result, outcomes reported in this section should be interpreted with caution.

# Science

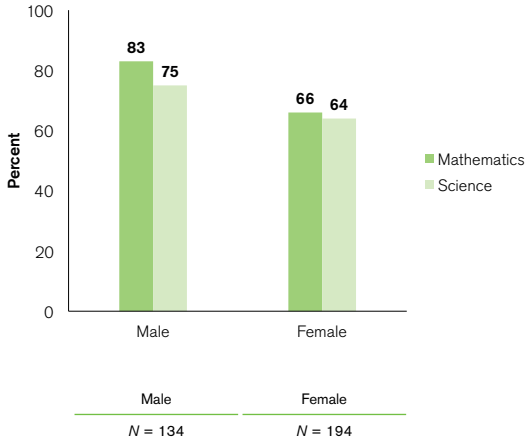
## Majors/Occupations

### *Overall STEM Interest*

**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Race/Ethnicity and Subject***

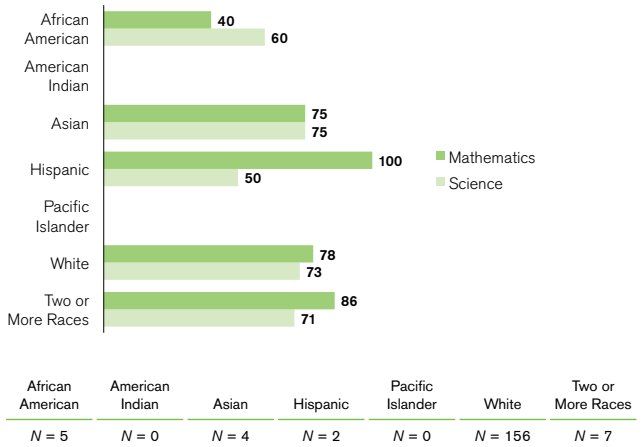



**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Gender and Subject**

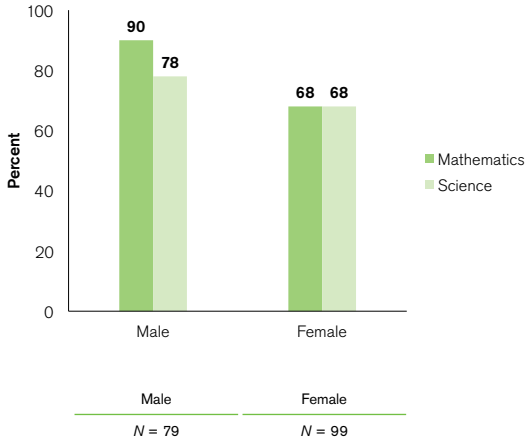



### *Expressed and Measured Interest*

**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Race/Ethnicity and Subject***




**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Gender and Subject**



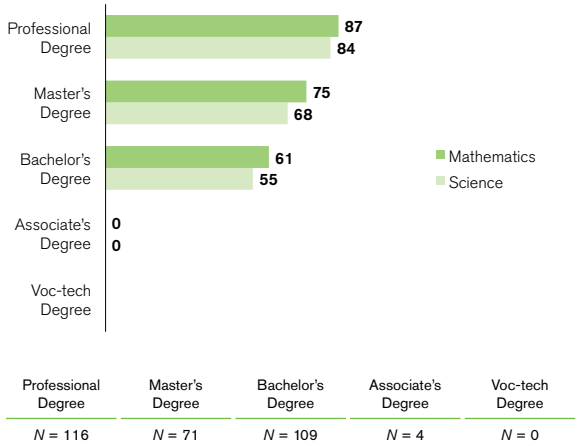

* Race/ethnicity categories changed for the 2010–2011 academic year to reflect updated US Department of Education reporting requirements.
Note: Reporting achievement by combinations of student characteristics may give rise to small *N* counts. As a result, outcomes reported in this section should be interpreted with caution.

# Science

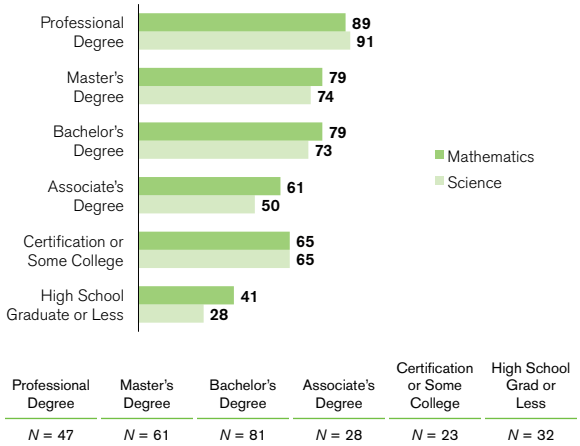
## Majors/Occupations

### *Overall STEM Interest*

**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Educational Aspirations and Subject**

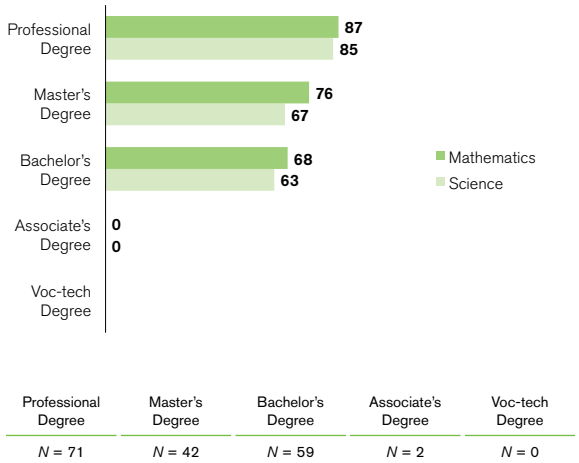



**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Highest Parental Education Level and Subject**

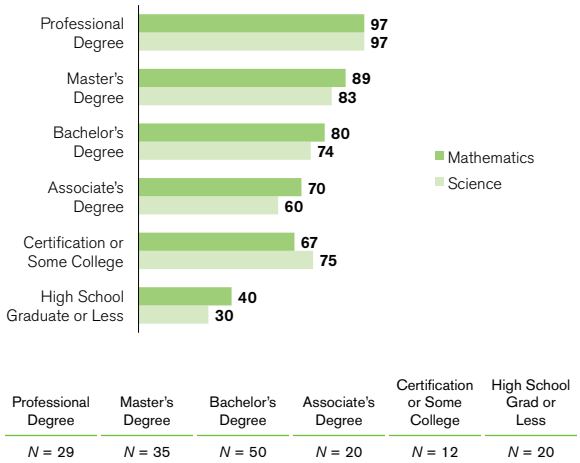



### *Expressed and Measured Interest*

**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Educational Aspirations and Subject**




**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Highest Parental Education Level and Subject**




Note: Reporting achievement by combinations of student characteristics may give rise to small *N* counts. As a result, outcomes reported in this section should be interpreted with caution.

# Science

## Majors/Occupations

| Science Majors/Occupations | Vermont *N* Counts and Percents | | | |
|---|---|---|---|---|
| | Overall STEM Interest* | | Expressed and Measured Only | |
| | *N* Count | Percent | *N* Count | Percent |
| Agronomy and Crop Science | 0 | 0 | 0 | 0 |
| Animal Sciences | 10 | 4 | 7 | 4 |
| Astronomy | 7 | 3 | 7 | 4 |
| Atmospheric Sciences and Meteorology | 5 | 2 | 5 | 3 |
| Biochemistry and Biophysics | 37 | 14 | 25 | 14 |
| Biology, General | 52 | 20 | 35 | 20 |
| Cell/Cellular Biology | 15 | 6 | 8 | 4 |
| Chemistry | 22 | 8 | 16 | 9 |
| Ecology | 4 | 2 | 1 | 1 |
| Environmental Science | 17 | 6 | 8 | 4 |
| Food Sciences and Technology | 1 | 0 | 1 | 1 |
| Forestry | 1 | 0 | 0 | 0 |
| Genetics | 15 | 6 | 8 | 4 |
| Geological and Earth Sciences | 4 | 2 | 2 | 1 |
| Horticulture Science | 0 | 0 | 0 | 0 |
| Marine/Aquatic Biology | 15 | 6 | 10 | 6 |
| Microbiology and Immunology | 10 | 4 | 8 | 4 |
| Natural Resources Conservation, General | 1 | 0 | 1 | 1 |
| Natural Resources Management | 1 | 0 | 0 | 0 |
| Physical Sciences, General | 6 | 2 | 4 | 2 |
| Physics | 11 | 4 | 11 | 6 |
| Science Education | 2 | 1 | 1 | 1 |
| Wildlife and Wildlands Management | 3 | 1 | 1 | 1 |
| Zoology | 24 | 9 | 19 | 11 |
| **Totals** | 263 | | 178 | |

* The "overall STEM interest" counts and percents do not include the "measured only interest" students, as they did not choose a STEM major or occupation.

# Computer Science and Mathematics

## Majors/Occupations

### *Overall STEM Interest*

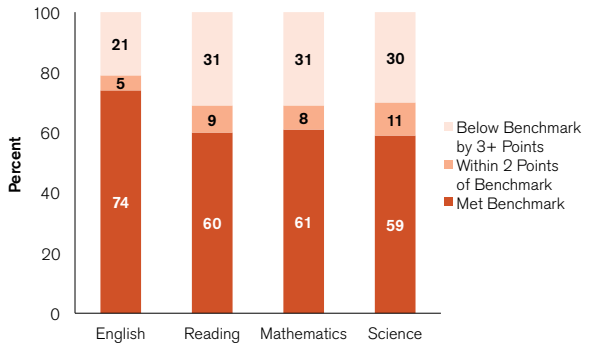
- Between 2011 and 2015, the percent of students interested in STEM increased by 1%.

**Student STEM Interest Trends: 2011–2015, State vs. Nation**

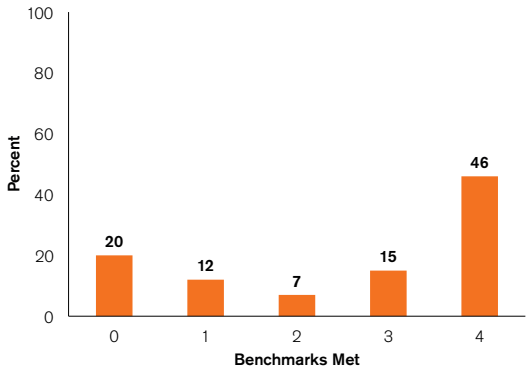
| | | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|
| Percent | Vermont | 10% | 8% | 9% | 11% | 11% |
| | Nation | 9% | 9% | 9% | 10% | 11% |
| *N* Count | Vermont | 99 | 78 | 86 | 113 | 124 |
| | Nation | 73,298 | 74,959 | 82,197 | 89,755 | 101,144 |

### *Overall STEM Interest* (*N* = 124)

**Percent of 2015 ACT-Tested High School Graduates by ACT College Readiness Benchmark Attainment and Subject**

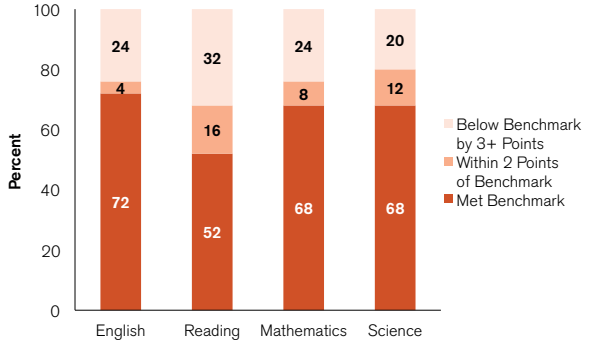



**Percent of 2015 ACT-Tested High School Graduates by Number of ACT College Readiness Benchmarks Attained**

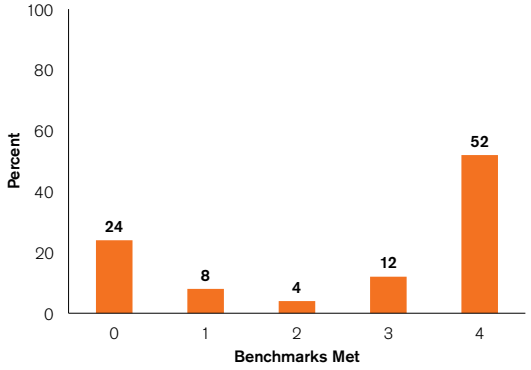



### *Expressed and Measured Interest* (*N* = 25)

**Percent of 2015 ACT-Tested High School Graduates by ACT College Readiness Benchmark Attainment and Subject**




**Percent of 2015 ACT-Tested High School Graduates by Number of ACT College Readiness Benchmarks Attained**



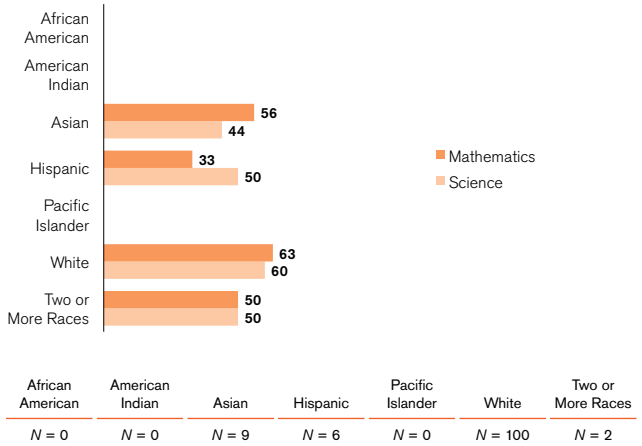

Note: Reporting achievement by combinations of student characteristics may give rise to small *N* counts. As a result, outcomes reported in this section should be interpreted with caution.

# Computer Science and Mathematics

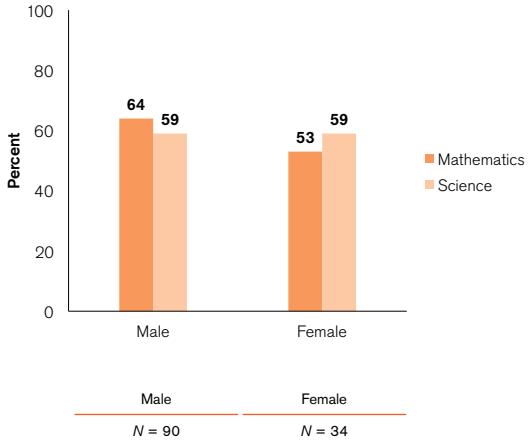
## Majors/Occupations

### *Overall STEM Interest*

**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Race/Ethnicity and Subject***

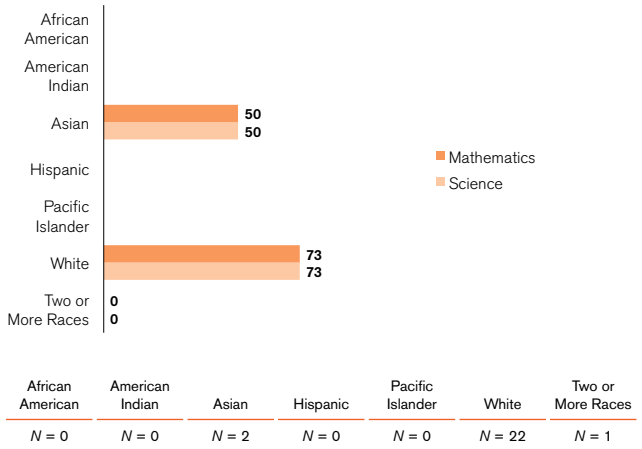



**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Gender and Subject**

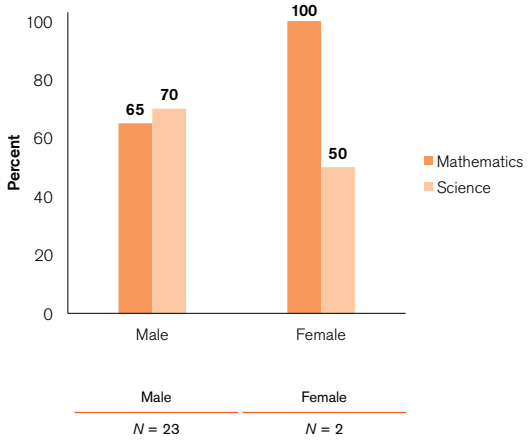



### *Expressed and Measured Interest*

**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Race/Ethnicity and Subject***




**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Gender and Subject**



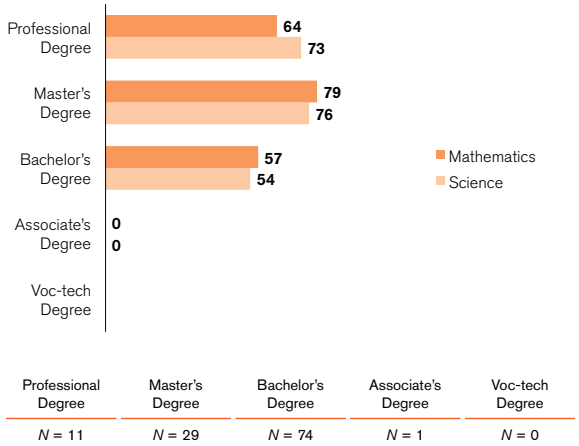

* Race/ethnicity categories changed for the 2010–2011 academic year to reflect updated US Department of Education reporting requirements.
Note: Reporting achievement by combinations of student characteristics may give rise to small *N* counts. As a result, outcomes reported in this section should be interpreted with caution.

# Computer Science and Mathematics

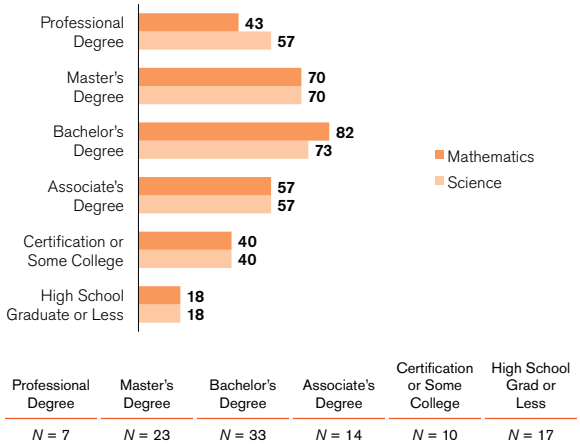
## Majors/Occupations

### *Overall STEM Interest*

**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Educational Aspirations and Subject**

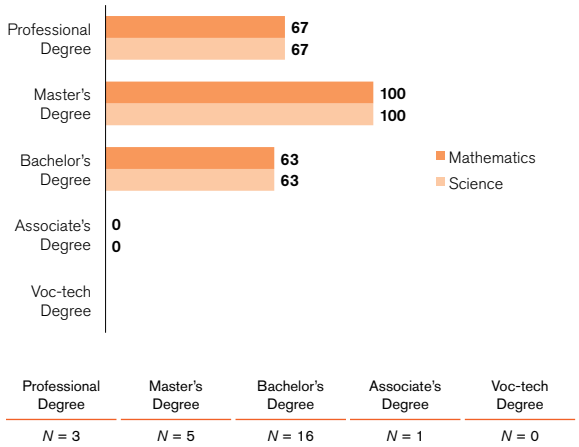



**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Highest Parental Education Level and Subject**

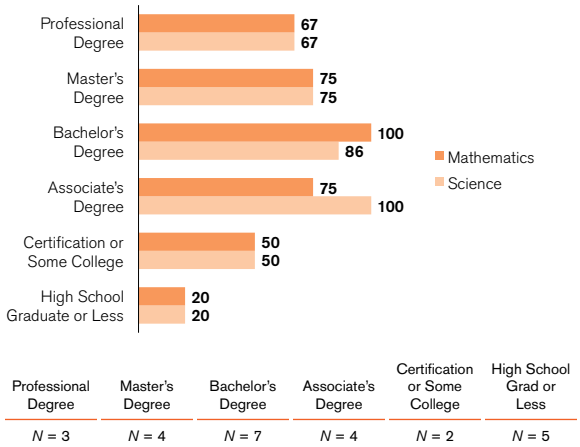



### *Expressed and Measured Interest*

**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Educational Aspirations and Subject**




**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Highest Parental Education Level and Subject**




Note: Reporting achievement by combinations of student characteristics may give rise to small *N* counts. As a result, outcomes reported in this section should be interpreted with caution.

# Computer Science and Mathematics

## Majors/Occupations

| Computer Science and Mathematics Majors/Occupations | Vermont *N* Counts and Percents | | | |
|---|---|---|---|---|
| | Overall STEM Interest* | | Expressed and Measured Only | |
| | *N* Count | Percent | *N* Count | Percent |
| Actuarial Science | 1 | 1 | 1 | 4 |
| Applied Mathematics | 7 | 7 | 2 | 8 |
| Business/Management Quantitative Methods, General | 7 | 7 | 0 | 0 |
| Computer and Information Sciences, General | 10 | 10 | 1 | 4 |
| Computer Network/Telecommunications | 7 | 7 | 2 | 8 |
| Computer Science and Programming | 37 | 39 | 14 | 56 |
| Computer Software and Media Application | 5 | 5 | 1 | 4 |
| Computer System Administration | 0 | 0 | 0 | 0 |
| Data Management Technology | 0 | 0 | 0 | 0 |
| Information Science | 2 | 2 | 1 | 4 |
| Management Information Systems | 2 | 2 | 0 | 0 |
| Mathematics Education | 8 | 8 | 1 | 4 |
| Mathematics, General | 4 | 4 | 1 | 4 |
| Statistics | 3 | 3 | 0 | 0 |
| Webpage Design | 3 | 3 | 1 | 4 |
| **Totals** | 96 | | 25 | |

* The "overall STEM interest" counts and percents do not include the "measured only interest" students, as they did not choose a STEM major or occupation.

# Medical and Health

## Majors/Occupations

### *Overall STEM Interest*

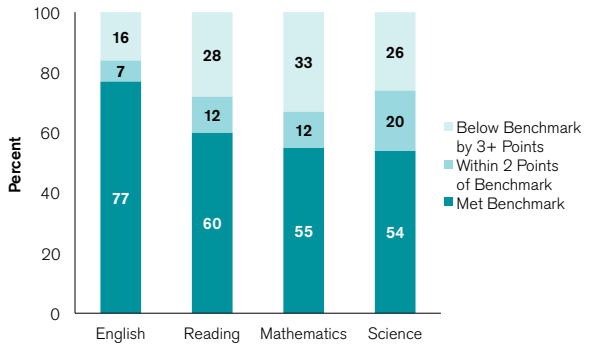
- Between 2011 and 2015, the percent of students interested in STEM increased by 1%.

**Student STEM Interest Trends: 2011–2015, State vs. Nation**

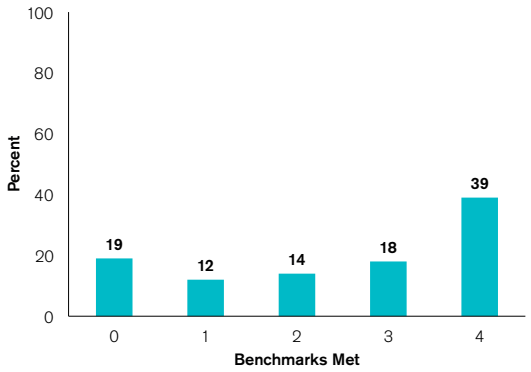
| | | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|
| Percent | Vermont | 36% | 37% | 35% | 35% | 37% |
| | Nation | 45% | 45% | 44% | 43% | 42% |
| *N* Count | Vermont | 351 | 354 | 325 | 356 | 400 |
| | Nation | 350,458 | 361,047 | 383,555 | 388,653 | 393,085 |

### *Overall STEM Interest* (*N* = 400)

**Percent of 2015 ACT-Tested High School Graduates by ACT College Readiness Benchmark Attainment and Subject**

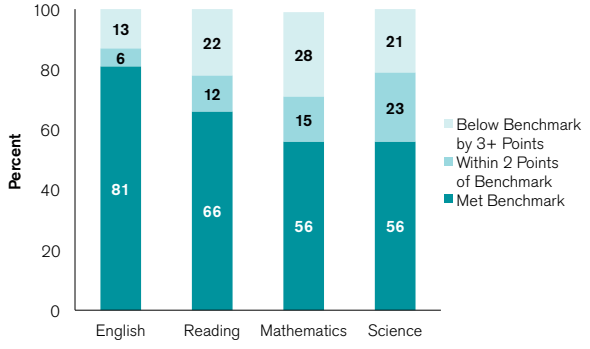



**Percent of 2015 ACT-Tested High School Graduates by Number of ACT College Readiness Benchmarks Attained**

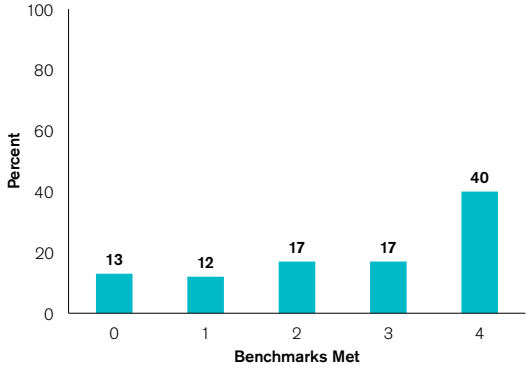



### *Expressed and Measured Interest* (*N* = 163)

**Percent of 2015 ACT-Tested High School Graduates by ACT College Readiness Benchmark Attainment and Subject**




**Percent of 2015 ACT-Tested High School Graduates by Number of ACT College Readiness Benchmarks Attained**



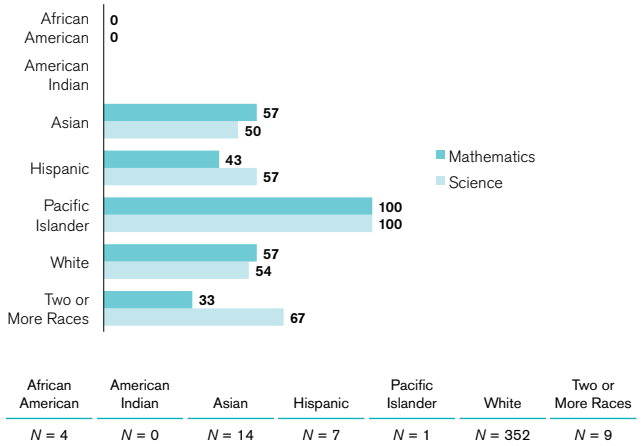

Note: Reporting achievement by combinations of student characteristics may give rise to small *N* counts. As a result, outcomes reported in this section should be interpreted with caution.

# Medical and Health

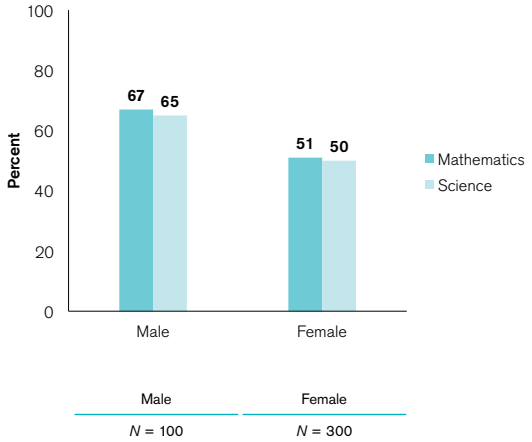
## Majors/Occupations

### *Overall STEM Interest*

**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Race/Ethnicity and Subject***

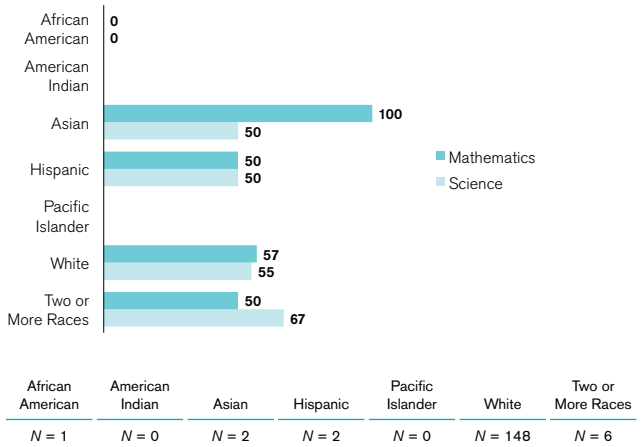



**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Gender and Subject**

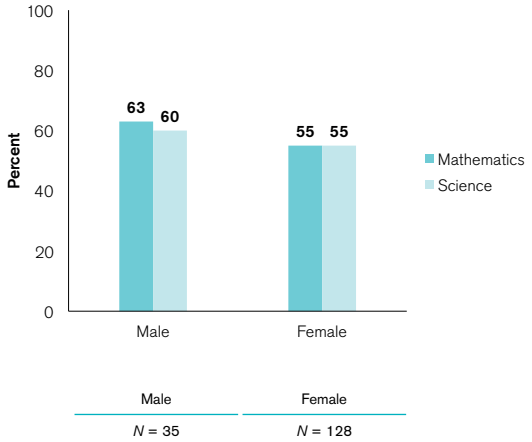



### *Expressed and Measured Interest*

**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Race/Ethnicity and Subject***




**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Gender and Subject**



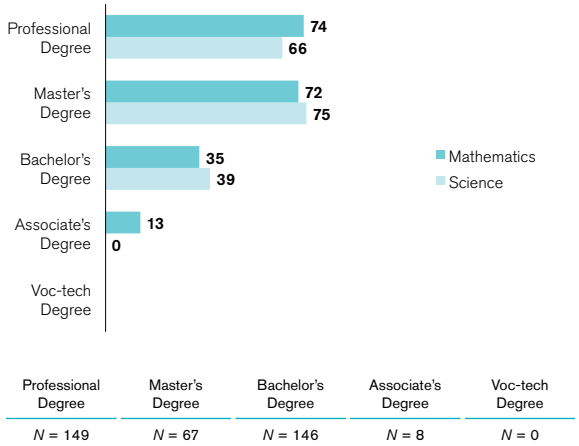

* Race/ethnicity categories changed for the 2010–2011 academic year to reflect updated US Department of Education reporting requirements.
Note: Reporting achievement by combinations of student characteristics may give rise to small *N* counts. As a result, outcomes reported in this section should be interpreted with caution.

# Medical and Health

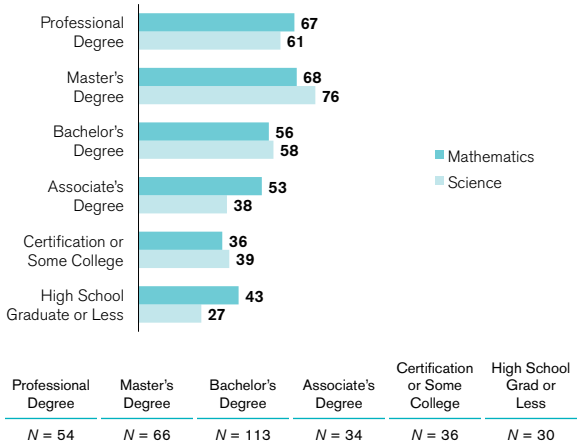
## Majors/Occupations

### *Overall STEM Interest*

**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Educational Aspirations and Subject**

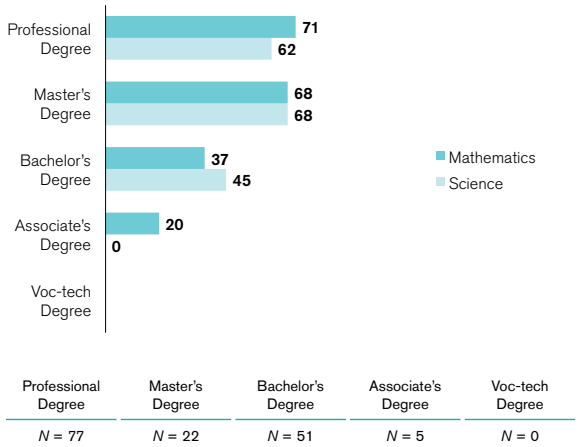



**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Highest Parental Education Level and Subject**

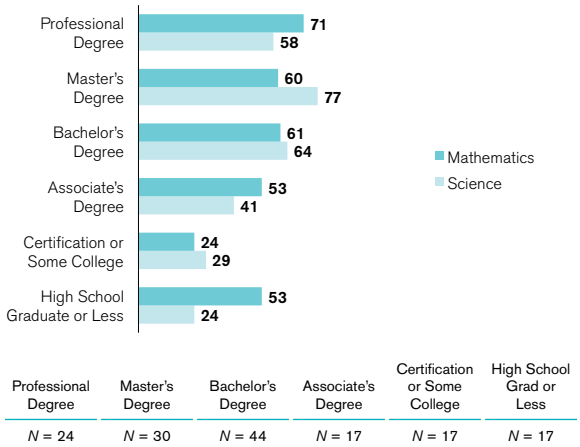



### *Expressed and Measured Interest*

**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Educational Aspirations and Subject**




**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Highest Parental Education Level and Subject**




Note: Reporting achievement by combinations of student characteristics may give rise to small *N* counts. As a result, outcomes reported in this section should be interpreted with caution.

# Medical and Health

## Majors/Occupations

| Medical and Health Majors/Occupations | Vermont *N* Counts and Percents | | | |
|---|---|---|---|---|
| | Overall STEM Interest* | | Expressed and Measured Only | |
| | *N* Count | Percent | *N* Count | Percent |
| Athletic Training | 27 | 9 | 14 | 9 |
| Chiropractic (Pre-Chiropractic) | 2 | 1 | 1 | 1 |
| Dentistry (Pre-Dentistry) | 7 | 2 | 5 | 3 |
| Emergency Medical Technology | 6 | 2 | 3 | 2 |
| Food and Nutrition | 2 | 1 | 1 | 1 |
| Health/Medical Technology, General | 12 | 4 | 5 | 3 |
| Medical Laboratory Technology | 2 | 1 | 1 | 1 |
| Medical Radiologic Technology | 16 | 5 | 7 | 4 |
| Medicine (Pre-Medicine) | 73 | 24 | 47 | 29 |
| Nuclear Medicine Technology | 1 | 0 | 1 | 1 |
| Nursing, Practical/Vocational (LPN) | 3 | 1 | 0 | 0 |
| Nursing, Registered (BS/RN) | 70 | 23 | 36 | 22 |
| Optometry (Pre-Optometry) | 0 | 0 | 0 | 0 |
| Osteopathic Medicine | 0 | 0 | 0 | 0 |
| Pharmacy (Pre-Pharmacy) | 9 | 3 | 4 | 2 |
| Physical Therapy (Pre-Physical Therapy) | 40 | 13 | 20 | 12 |
| Physician Assisting | 16 | 5 | 9 | 6 |
| Respiratory Therapy Technology | 0 | 0 | 0 | 0 |
| Surgical Technology | 1 | 0 | 1 | 1 |
| Veterinarian Assisting/Technology | 1 | 0 | 1 | 1 |
| Veterinary Medicine (Pre-Vet) | 11 | 4 | 7 | 4 |
| **Totals** | 299 | | 163 | |

* The "overall STEM interest" counts and percents do not include the "measured only interest" students, as they did not choose a STEM major or occupation.

# Engineering and Technology

## Majors/Occupations

### *Overall STEM Interest*

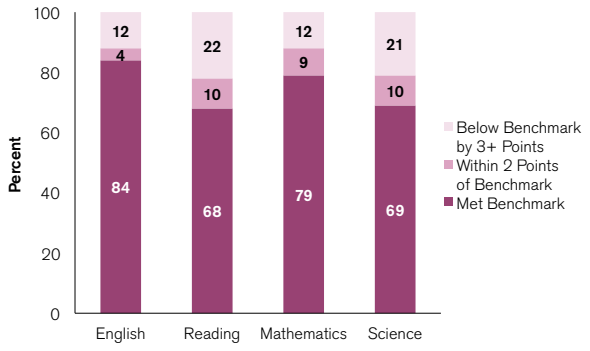
- Between 2011 and 2015, the percent of students interested in STEM increased by 2%.

**Student STEM Interest Trends: 2011–2015, State vs. Nation**

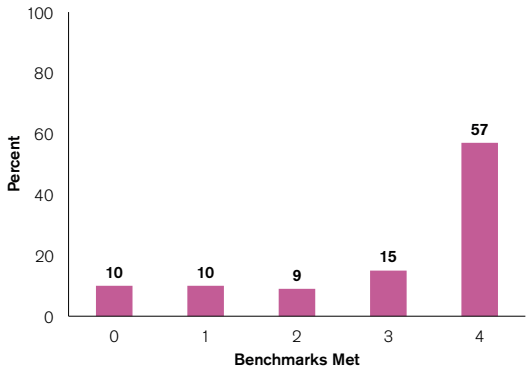
| | | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|
| Percent | Vermont | 20% | 22% | 23% | 22% | 22% |
| | Nation | 23% | 23% | 24% | 25% | 25% |
| *N* Count | Vermont | 198 | 209 | 217 | 226 | 241 |
| | Nation | 180,295 | 184,644 | 207,344 | 220,815 | 236,300 |

### *Overall STEM Interest* (*N* = 241)

**Percent of 2015 ACT-Tested High School Graduates by ACT College Readiness Benchmark Attainment and Subject**

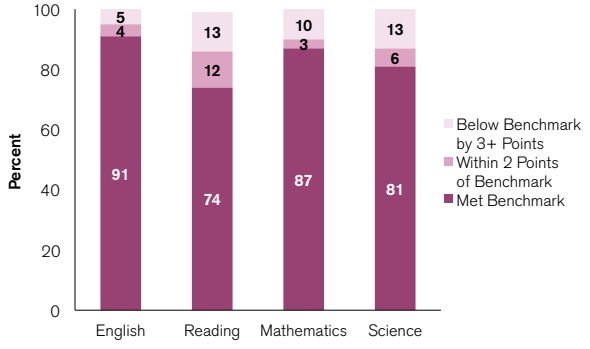



**Percent of 2015 ACT-Tested High School Graduates by Number of ACT College Readiness Benchmarks Attained**

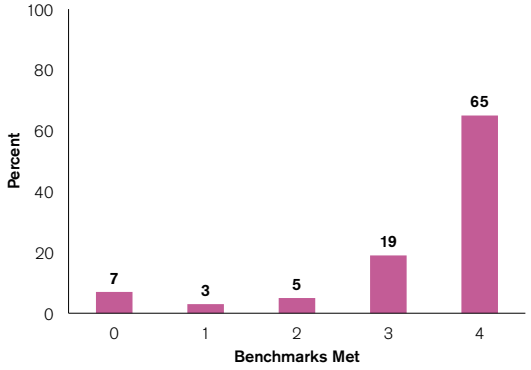



### *Expressed and Measured Interest* (*N* = 98)

**Percent of 2015 ACT-Tested High School Graduates by ACT College Readiness Benchmark Attainment and Subject**




**Percent of 2015 ACT-Tested High School Graduates by Number of ACT College Readiness Benchmarks Attained**



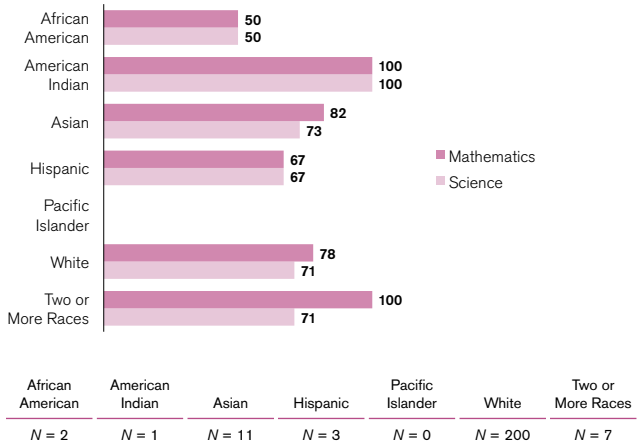

Note: Reporting achievement by combinations of student characteristics may give rise to small *N* counts. As a result, outcomes reported in this section should be interpreted with caution.

# Engineering and Technology

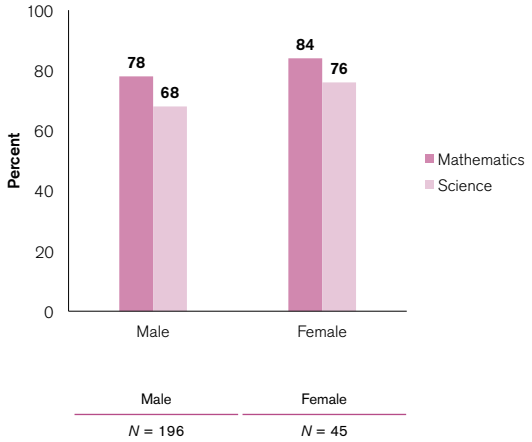
## Majors/Occupations

### *Overall STEM Interest*

**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Race/Ethnicity and Subject***

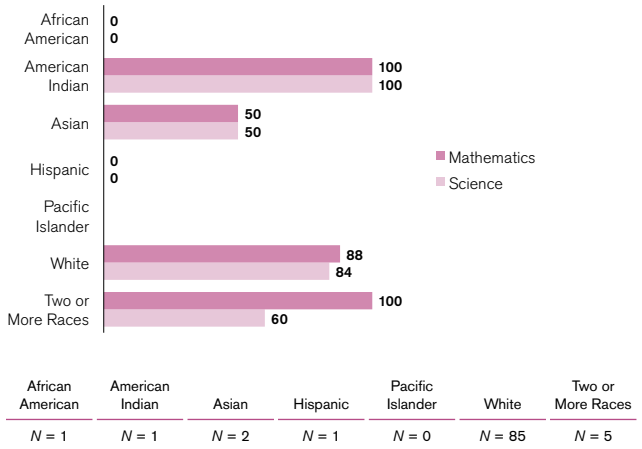



**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Gender and Subject**

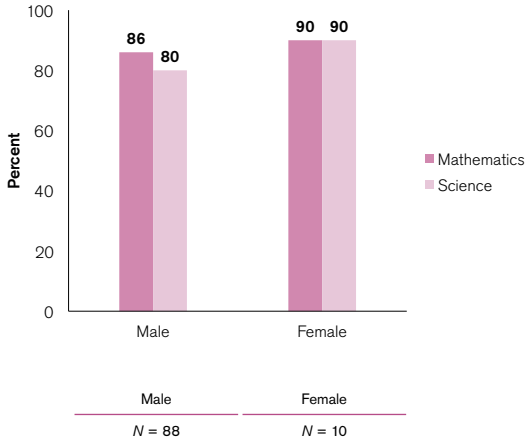



### *Expressed and Measured Interest*

**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Race/Ethnicity and Subject***




**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Gender and Subject**



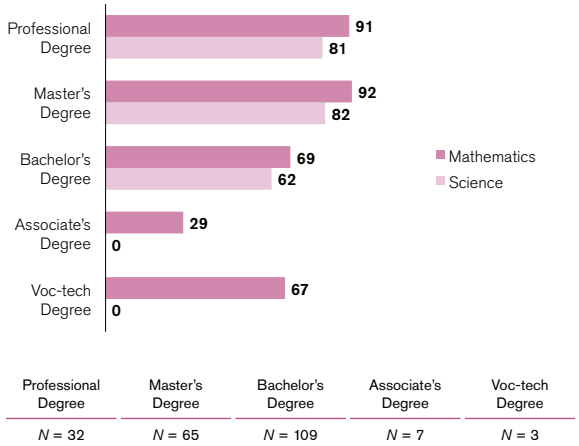

* Race/ethnicity categories changed for the 2010–2011 academic year to reflect updated US Department of Education reporting requirements.
Note: Reporting achievement by combinations of student characteristics may give rise to small *N* counts. As a result, outcomes reported in this section should be interpreted with caution.

# Engineering and Technology

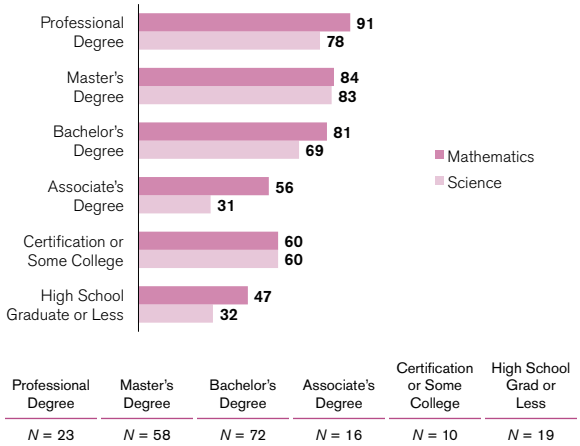
## Majors/Occupations

### *Overall STEM Interest*

**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Educational Aspirations and Subject**

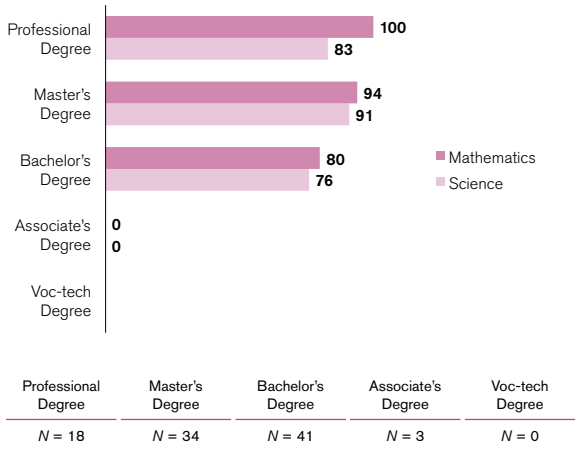



**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Highest Parental Education Level and Subject**

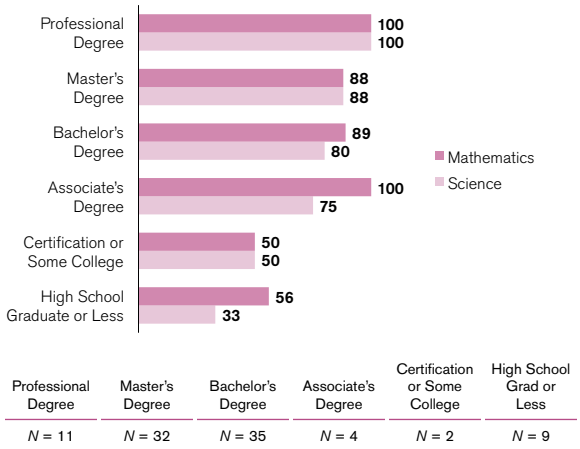



### *Expressed and Measured Interest*

**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Educational Aspirations and Subject**




**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Highest Parental Education Level and Subject**




Note: Reporting achievement by combinations of student characteristics may give rise to small *N* counts. As a result, outcomes reported in this section should be interpreted with caution.

# Engineering and Technology

## Majors/Occupations

| Engineering and Technology Majors/Occupations | Vermont *N* Counts and Percents | | | |
|---|---|---|---|---|
| | Overall STEM Interest* | | Expressed and Measured Only | |
| | *N* Count | Percent | *N* Count | Percent |
| Aeronautical/Aerospace Engineering Technology | 1 | 0 | 0 | 0 |
| Aerospace/Aeronautical Engineering | 17 | 8 | 12 | 12 |
| Agricultural/Bioengineering | 1 | 0 | 0 | 0 |
| Architectural Drafting/CAD Technology | 2 | 1 | 0 | 0 |
| Architectural Engineering | 4 | 2 | 0 | 0 |
| Architectural Engineering Technology | 2 | 1 | 2 | 2 |
| Architecture, General | 11 | 5 | 0 | 0 |
| Automotive Engineering Technology | 3 | 1 | 2 | 2 |
| Biomedical Engineering | 20 | 9 | 14 | 14 |
| Chemical Engineering | 13 | 6 | 5 | 5 |
| Civil Engineering | 25 | 11 | 12 | 12 |
| Civil Engineering Technology | 2 | 1 | 1 | 1 |
| Computer Engineering | 12 | 6 | 6 | 6 |
| Computer Engineering Technology | 3 | 1 | 2 | 2 |
| Construction Engineering/Management | 0 | 0 | 0 | 0 |
| Construction/Building Technology | 0 | 0 | 0 | 0 |
| Drafting/CAD Technology, General | 0 | 0 | 0 | 0 |
| Electrical, Electronic, and Communication Engineering | 15 | 7 | 4 | 4 |
| Electrical/Electronics Engineering Technology | 1 | 0 | 1 | 1 |
| Electromechanical/Biomedical Engineering Technology | 1 | 0 | 0 | 0 |
| Engineering (Pre-Engineering), General | 22 | 10 | 6 | 6 |
| Engineering Technology, General | 2 | 1 | 2 | 2 |
| Environmental Control Technologies | 0 | 0 | 0 | 0 |
| Environmental Health Engineering | 5 | 2 | 0 | 0 |
| Industrial Engineering | 2 | 1 | 0 | 0 |
| Industrial Production Technologies | 1 | 0 | 1 | 1 |
| Mechanical Drafting/CAD Technology | 0 | 0 | 0 | 0 |
| Mechanical Engineering | 51 | 23 | 27 | 28 |
| Mechanical Engineering Technology | 1 | 0 | 1 | 1 |
| Military Technologies | 0 | 0 | 0 | 0 |
| Nuclear Engineering | 0 | 0 | 0 | 0 |
| Quality Control and Safety Technologies | 1 | 0 | 0 | 0 |
| Surveying Technology | 0 | 0 | 0 | 0 |
| **Totals** | 218 | | 98 | |

* The "overall STEM interest" counts and percents do not include the "measured only interest" students, as they did not choose a STEM major or occupation.

# Vermont ACT STEM Benchmarks

## Student Readiness for STEM College Coursework

ACT added a new STEM score to ACT student score reports in fall 2015. Our goal was to provide students and educators with greater insight into critical aspects of college readiness. This score, derived from the ACT mathematics and science scores, represents students' overall performance in these two subject areas. Recent research indicated that academic readiness for college coursework in STEM subject areas may require higher scores than the current ACT College Readiness Benchmarks in math and science.[3] The findings of this research sparked the development of the ACT STEM Benchmark score.

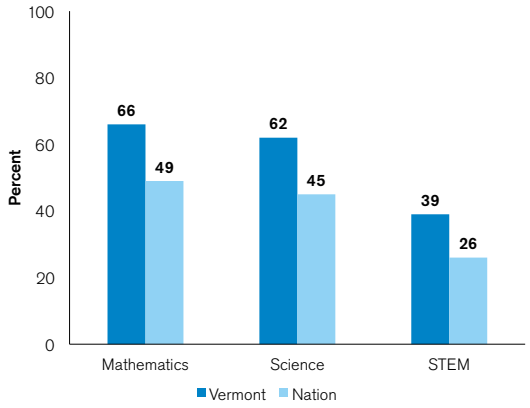
The ACT STEM College Readiness Benchmark was developed using the same methodology as the single subject area ACT College Readiness Benchmark. Typical grades in first-year college STEM courses (Calculus, General Biology, General Chemistry, and Physics) were combined in a single course success model to determine the ACT STEM test score that was associated with at least a 50% chance of earning a B or higher or a 75% chance of earning a C or higher in those courses. The resulting ACT STEM College Readiness Benchmark score was 26. Based on that Benchmark, only 20% of the 2015 ACT-tested high school graduating class was ready for first-year STEM college courses.

ACT STEM Benchmark scores are related not only to succeeding in individual math and science courses, but also to achieving longer-term outcomes. Mattern et al. (2015) showed that students with STEM majors who met the ACT STEM Benchmark were more likely to earn a cumulative grade point average of 3.0 or higher, persist in a STEM major, and earn a STEM-related bachelor's degree than those who failed to meet the Benchmark. Additionally, ongoing research suggests that providing STEM readiness information to prospective students may help facilitate the transition to college by aligning students' expectations with course demands.

### *Overall STEM Interest*

- 1,093 graduates have an interest in STEM.

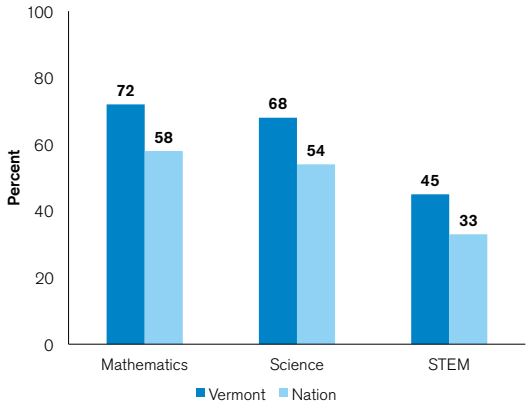
**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Subject**




### *Expressed and Measured Interest*

- 464 graduates have an expressed and measured interest in STEM, which is 42% of the overall interest.

**Percent of 2015 ACT-Tested High School Graduates Meeting ACT College Readiness Benchmarks by Subject**

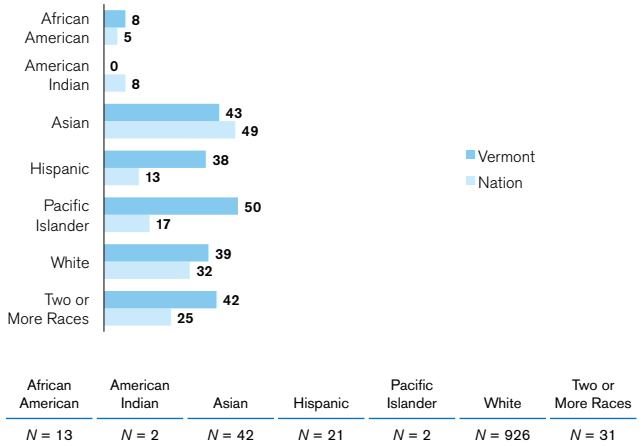


# Vermont ACT STEM Benchmarks

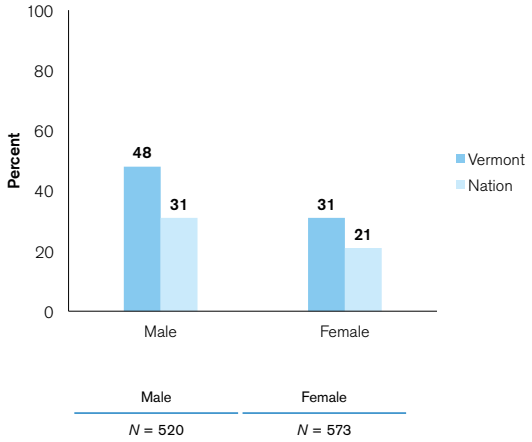
## Student Readiness for STEM College Coursework

### *Overall STEM Interest*

**Percent of 2015 ACT-Tested High School Graduates Meeting the ACT STEM Benchmark by Race/Ethnicity***

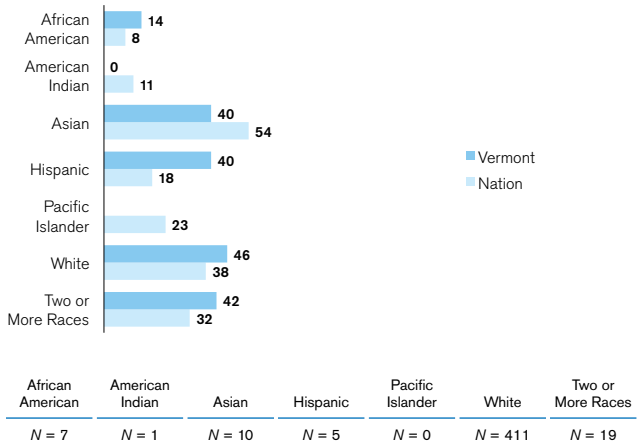



**Percent of 2015 ACT-Tested High School Graduates Meeting the ACT STEM Benchmark by Gender**

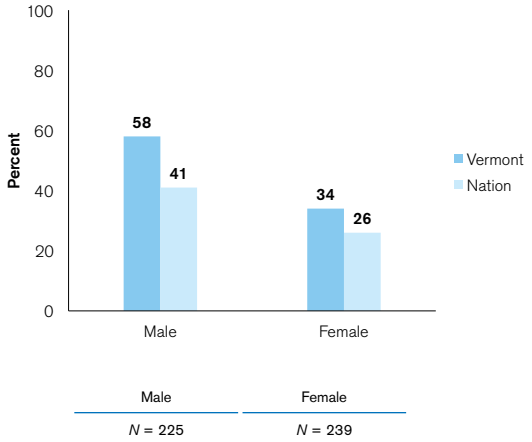



### *Expressed and Measured Interest*

**Percent of 2015 ACT-Tested High School Graduates Meeting the ACT STEM Benchmark by Race/Ethnicity***




**Percent of 2015 ACT-Tested High School Graduates Meeting the ACT STEM Benchmark by Gender**




* Race/ethnicity categories changed for the 2010–2011 academic year to reflect updated US Department of Education reporting requirements.

# STEM
## Interest and Achievement by State

| State | Percent of All Graduates Tested* | Percent of All ACT-Tested Graduates Interested in STEM | Percent of STEM Students Meeting Benchmarks | | | |
|---|---|---|---|---|---|---|
| | | | English | Reading | Math | Science |
| **Alabama** | 100 | 52 | 58 | 38 | 28 | 29 |
| **Colorado** | 100 | 45 | 69 | 49 | 49 | 48 |
| **Illinois** | 100 | 42 | 69 | 47 | 49 | 45 |
| **Kentucky** | 100 | 49 | 64 | 43 | 37 | 38 |
| **Louisiana** | 100 | 51 | 64 | 39 | 32 | 32 |
| **Michigan** | 100 | 47 | 64 | 46 | 42 | 42 |
| **Mississippi** | 100 | 52 | 57 | 35 | 26 | 25 |
| **Montana** | 100 | 48 | 63 | 49 | 48 | 44 |
| **North Carolina** | 100 | 50 | 52 | 37 | 38 | 31 |
| **North Dakota** | 100 | 45 | 67 | 46 | 51 | 47 |
| **Tennessee** | 100 | 48 | 64 | 43 | 36 | 36 |
| **Utah** | 100 | 45 | 64 | 50 | 42 | 42 |
| **Wyoming** | 100 | 47 | 65 | 45 | 43 | 41 |
| **Arkansas** | 93 | 48 | 67 | 47 | 41 | 38 |
| **Hawaii** | 93 | 45 | 52 | 36 | 37 | 29 |
| **Nebraska** | 88 | 48 | 73 | 54 | 51 | 49 |
| **Oklahoma** | 80 | 51 | 68 | 51 | 39 | 39 |
| **Florida** | 79 | 47 | 60 | 47 | 40 | 36 |
| **Minnesota** | 78 | 50 | 78 | 63 | 66 | 60 |
| **Missouri** | 77 | 49 | 74 | 55 | 51 | 48 |
| **South Dakota** | 76 | 55 | 74 | 58 | 56 | 51 |
| **Kansas** | 74 | 49 | 75 | 57 | 56 | 51 |
| **Ohio** | 73 | 49 | 75 | 58 | 56 | 53 |
| **Wisconsin** | 73 | 50 | 78 | 59 | 60 | 58 |
| **New Mexico** | 71 | 57 | 56 | 42 | 37 | 34 |
| **Iowa** | 67 | 48 | 80 | 61 | 56 | 56 |
| **West Virginia** | 66 | 56 | 72 | 51 | 40 | 40 |
| **South Carolina** | 62 | 52 | 64 | 46 | 43 | 39 |
| **Georgia** | 58 | 51 | 66 | 49 | 43 | 40 |
| **Arizona** | 56 | 47 | 61 | 44 | 46 | 39 |
| **District of Columbia** | 42 | 36 | 63 | 50 | 51 | 44 |
| **Idaho** | 42 | 54 | 80 | 64 | 61 | 54 |

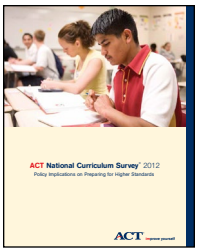
# STEM
## Interest and Achievement by State

| State | Percent of All Graduates Tested* | Percent of All ACT-Tested Graduates Interested in STEM | Percent of STEM Students Meeting Benchmarks | | | |
|---|---|---|---|---|---|---|
| | | | English | Reading | Math | Science |
| **Indiana** | 41 | 51 | 76 | 59 | 60 | 52 |
| **Texas** | 41 | 53 | 63 | 48 | 50 | 43 |
| **Nevada** | 40 | 52 | 66 | 49 | 49 | 43 |
| **Alaska** | 39 | 53 | 71 | 57 | 55 | 45 |
| **Oregon** | 38 | 45 | 72 | 56 | 56 | 52 |
| **Connecticut** | 32 | 45 | 88 | 71 | 73 | 67 |
| **California** | 30 | 52 | 75 | 57 | 62 | 52 |
| **Virginia** | 30 | 52 | 80 | 64 | 64 | 58 |
| **New Jersey** | 29 | 46 | 80 | 63 | 70 | 59 |
| **Vermont** | 29 | 50 | 81 | 67 | 66 | 62 |
| **Massachusetts** | 28 | 47 | 86 | 69 | 76 | 67 |
| **New York** | 28 | 48 | 82 | 67 | 73 | 66 |
| **Maryland** | 25 | 51 | 76 | 60 | 62 | 57 |
| **Washington** | 25 | 50 | 75 | 63 | 66 | 59 |
| **New Hampshire** | 23 | 49 | 88 | 71 | 75 | 69 |
| **Pennsylvania** | 22 | 53 | 80 | 63 | 66 | 59 |
| **Delaware** | 21 | 56 | 80 | 67 | 64 | 59 |
| **Rhode Island** | 19 | 50 | 81 | 66 | 65 | 59 |
| **Maine** | 10 | 55 | 86 | 70 | 71 | 66 |
| **Nation** | 59 | 49 | 68 | 50 | 49 | 45 |

* Totals for graduating seniors were obtained from *Knocking at the College Door: Projections of High School Graduates*, 8th edition. © December 2012 by the Western Interstate Commission for Higher Education.

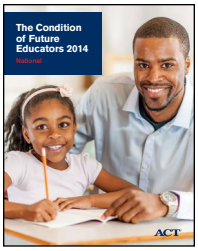
# ACT Research

As a nonprofit educational research organization, ACT is committed to producing research that focuses on key issues in education and workforce development. Our goal is to serve as a data resource. We strive to provide policymakers with the information they need to inform education and workforce development policy and to give educators the tools they need to lead more students toward college and career success. What follows are some recent and groundbreaking ACT research studies related to STEM. To review these studies, go to **www.act.org/research/summary**.



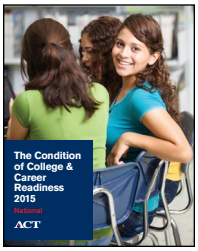

### ACT National Curriculum Survey®

The ACT National Curriculum Survey is a nationwide survey of educational practices and expectations. Conducted every three to five years by ACT, the survey collects data about what entering college students should know and be able to do to be ready for college-level coursework in English, math, reading, and science. **www.act.org/research-policy/national-curriculum-survey**



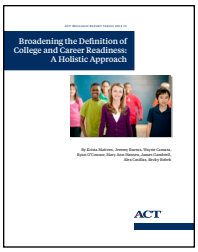

### The Condition of Future Educators 2014

Data from past ACT *Condition of STEM* reports have shown there are few students interested in math or science education as a profession. This report provides current educators and policymakers a glimpse inside the pipeline of future educators.
**www.act.org/futureeducators**



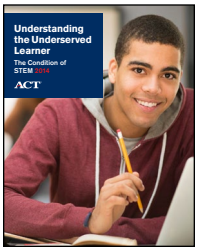

### The Condition of College & Career Readiness 2015

Using ACT scores and the ACT College Readiness Benchmarks, *The Condition of College & Career Readiness 2015* provides data highlighting the college and career readiness of the ACT-tested high school class of 2015. This report is updated annually.
**www.act.org/research/policymakers/cccr15**




### Broadening the Definition of College and Career Readiness: A Holistic Approach

*The Condition of College & Career Readiness 2015* report revealed that only 28% of 2015 ACT-tested high school graduates met all four ACT College Readiness Benchmarks. A more holistic approach to college and career readiness is in order. This report provides evidence that educators, policymakers, and employers embrace a wide variety of skills critical for success. The research also shows that we can improve prediction of college and career readiness by measuring a broader range of skills.
**www.act.org/research/researchers/reports/pdf/ACT_RR2014-5.pdf**




### Understanding the Underserved Learner—The Condition of STEM 2014

In developing *Understanding the Underserved Learner—The Condition of STEM 2014*, ACT's goal was to further advance STEM readiness and to honor its commitments to engaging underserved learners in pursuit of their college and career goals. Identifying these students and determining their readiness in math and science could provide them with more opportunities to successfully enter STEM careers and help address the national deficit of skilled STEM workers.
**www.act.org/stemcondition/14/pdf/STEM-Underserved-Learner.pdf**

# STEM Resources

ACT has connected with state STEM councils across the country to identify valuable STEM-related resources. These are the top resources suggested by STEM experts.

### STEM Premier®

STEM Premier is a virtual platform that connects STEM students with higher education and the workforce. Students can showcase their skills, get ranked and rated, receive guidance, and find STEM scholarships while colleges, technical schools, and corporations can identify, track, and recruit STEM Premier talent.

**www.stempremier.com**

### STEMconnector®

STEMconnector is the "one-stop shop" for STEM information. With several products and services, STEMconnector supports its members in the design, implementation, and measurement of their STEM strategies. Since its launch in 2011, STEMconnector has been the leader in leveraging a network of STEM stakeholders to "make things happen." STEMconnector's charge is to identify, inform, and connect entities working in STEM education and careers to assess smart STEM investments and results.

**www.stemconnector.org**

### USA Science and Engineering Festival

The USA Science and Engineering Festival attracts thousands of K–12 students, parents, teachers, and STEM professionals in the largest national celebration of STEM. The fourth annual conference will be held April 15–17, 2016, in Washington, DC.

**www.usasciencefestival.org**

### National Science Teachers Association

The National Science Teachers Association, founded in 1944 and headquartered in Arlington, Va., is the largest organization in the world committed to promoting excellence and innovation in science teaching and learning for all. NSTA's current membership of 55,000 includes science teachers, science supervisors, administrators, scientists, business and industry representatives, and others involved in and committed to science education.

**www.nsta.org**

### Learning Blade®

From the creators of ACT KeyTrain®, Learning Blade is an online system that fosters interest in STEM careers among middle and early high school students. The system includes game-based "missions" that educate students on STEM careers and technologies in a system validated by BattelleEd, providing teachers with STEM instruction and analytics to improve academic performance.

**www.learningblade.com**

### USNews.com

The *US News* STEM Solutions National Leadership Conference is focused on improving America's science, technology, engineering, and math workforce. As a digital media company committed to covering STEM through in-depth reporting, research, and analysis, *US News & World Report* will bring the fifth annual leadership conference to the Hilton Baltimore on May 18–20, 2016.

**www.usnews.com/news/stem-solutions**

## *ACT-Defined STEM Majors and Occupations by Area*

| Science Majors/Occupations |
|---|
| Agronomy and Crop Science |
| Animal Sciences |
| Astronomy |
| Atmospheric Sciences and Meteorology |
| Biochemistry and Biophysics |
| Biology, General |
| Cell/Cellular Biology |
| Chemistry |
| Ecology |
| Environmental Science |
| Food Sciences and Technology |
| Forestry |
| Genetics |
| Geological and Earth Sciences |
| Horticulture Science |
| Marine/Aquatic Biology |
| Microbiology and Immunology |
| Natural Resources Conservation, General |
| Natural Resources Management |
| Physical Sciences, General |
| Physics |
| Science Education |
| Wildlife and Wildlands Management |
| Zoology |
| **Computer Science and Mathematics Majors/Occupations** |
| Actuarial Science |
| Applied Mathematics |
| Business/Management Quantitative Methods, General |
| Computer and Information Sciences, General |
| Computer Network/Telecommunications |
| Computer Science and Programming |
| Computer Software and Media Application |
| Computer System Administration |
| Data Management Technology |
| Information Science |
| Management Information Systems |
| Mathematics Education |
| Mathematics, General |
| Statistics |
| Webpage Design |
| **Medical and Health Majors/Occupations** |
| Athletic Training |
| Chiropractic (Pre-Chiropractic) |
| Dentistry (Pre-Dentistry) |
| Emergency Medical Technology |
| Food and Nutrition |
| Health/Medical Technology, General |
| Medical Laboratory Technology |
| Medical Radiologic Technology |
| Medicine (Pre-Medicine) |
| Nuclear Medicine Technology |
| Nursing, Practical/Vocational (LPN) |
| Nursing, Registered (BS/RN) |
| Optometry (Pre-Optometry) |
| Osteopathic Medicine |
| Pharmacy (Pre-Pharmacy) |
| Physical Therapy (Pre-Physical Therapy) |
| Physician Assisting |
| Respiratory Therapy Technology |
| Surgical Technology |
| Veterinarian Assisting/Technology |
| Veterinary Medicine (Pre-Vet) |
| **Engineering and Technology Majors/Occupations** |
| Aeronautical/Aerospace Engineering Technology |
| Aerospace/Aeronautical Engineering |
| Agricultural/Bioengineering |
| Architectural Drafting/CAD Technology |
| Architectural Engineering |
| Architectural Engineering Technology |
| Architecture, General |
| Automotive Engineering Technology |
| Biomedical Engineering |
| Chemical Engineering |
| Civil Engineering |
| Civil Engineering Technology |
| Computer Engineering |
| Computer Engineering Technology |
| Construction Engineering/Management |
| Construction/Building Technology |
| Drafting/CAD Technology, General |
| Electrical, Electronic, and Communication Engineering |
| Electrical/Electronics Engineering Technology |
| Electromechanical/Biomedical Engineering Technology |
| Engineering (Pre-Engineering), General |
| Engineering Technology, General |
| Environmental Control Technologies |
| Environmental Health Engineering |
| Industrial Engineering |
| Industrial Production Technologies |
| Mechanical Drafting/CAD Technology |
| Mechanical Engineering |
| Mechanical Engineering Technology |
| Military Technologies |
| Nuclear Engineering |
| Quality Control and Safety Technologies |
| Surveying Technology |

# Vermont STEM Report

## Notes

1. When individuals register for the ACT, they are asked to choose a college major they plan to enter as well as an occupational choice from a list of 294 major and occupational titles. Of these 294 titles, 93 have been identified as STEM related. Assignment of ACT titles to STEM titles was conducted by an expert panel of ACT staff members with knowledge of labor market trends and postsecondary academic programs. 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. ACT titles were assigned to STEM when both the corresponding BLS and ICE titles were included in STEM or when the corresponding BLS title was included in STEM and the profile of measured interests of students planning to enter this occupation peaked on the Science and Technology scale. These two guidelines accounted for 89 of the 93 ACT titles assigned to STEM. The remaining four titles were assigned to STEM based on the judged intensiveness of their math and science coursework (major) or work tasks (occupation). ACT titles in the Social Sciences were excluded from this STEM list because many STEM taxonomies do not include majors and occupations in this field.

2. Students were assigned to one of three STEM cohorts: Expressed and Measured, Expressed Only, or Measured Only. These cohorts were based on the pairing of Expressed and Measured STEM interest types, where:
   - Students with expressed STEM interest planned on a STEM major or occupation following high school.
   - Students with measured STEM interest had a highest ACT Interest Inventory score in Science or had a highest ACT Interest Inventory score in Technology and a second-highest score in Science.

   Within each STEM cohort, students were also assigned to one of four STEM areas: Science, Computer Science and Mathematics, Medical and Health, or Engineering and Technology. STEM areas for students in the Expressed and Measured Interest cohort and the Expressed Interest Only cohort were based on the STEM area of students' planned major. If planned major was not STEM, then the STEM area of their planned occupation was used. For students in the Measured Interest Only cohort, STEM area was based on a crosswalk between ACT Interest Inventory score profile and planned major. The crosswalk was created from a national sample of undergraduate students with a declared major and a grade point average of at least 2.0. (For more information about the crosswalk, go to **www.act.org/emtrends/12/interestmajor.html**.)

3. Mattern, K., Radunzel, J., & Westrick P. (2015). *Development of STEM readiness benchmarks to assist career and educational decision making.* (ACT Research Report 2015-3). Iowa City, IA: ACT, Inc.

ACT is an independent, nonprofit organization that provides assessment, research, information, and program management services in the broad areas of education and workforce development. Each year, we serve millions of people in high schools, colleges, professional associations, businesses, and government agencies, nationally and internationally. Though designed to meet a wide array of needs, all ACT programs and services have one guiding purpose—helping people achieve education and workplace success.

This report can be found at
**www.act.org/stemcondition**

ACT®

* 0 7 0 8 4 9 1 6 0 * Rev 1