The Condition of STEM 2015

Montana

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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.

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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.

Montana STEM Report

Attainment of College and Career Readiness

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	Montana	51%	52%	51%	49%	48%
	Nation	48%	48%	48%	49%	49%
N Count	Montana	3,096	3,132	3,387	4,707	4,589
	Nation	780,541	804,507	868,194	899,684	939,049

Overall STEM Interest

- 4,589 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

- 1,584 of your graduates have an expressed and measured interest in STEM, which is 35% of the overall interest.

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

Expressed Interest Only

- 2,005 of your graduates have an expressed interest in STEM, which is 44% of the overall interest.

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

Measured Interest Only

- 1,000 of your graduates have a measured interest in STEM, which is 22% 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.

Montana STEM Report

Attainment of College and Career Readiness

Overall STEM Interest (*N* = 4,589)

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* = 1,584)

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

Montana 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.

Montana 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

Professional Degree	Master's Degree	Bachelor's Degree	Associate's Degree	Voc-tech Degree
N = 1,092	*N* = 592	*N* = 2,113	*N* = 365	*N* = 105

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

Professional Degree	Master's Degree	Bachelor's Degree	Associate's Degree	Certification or Some College	High School Grad or Less
N = 349	*N* = 518	*N* = 1,389	*N* = 489	*N* = 757	*N* = 820

Expressed and Measured Interest

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

Professional Degree	Master's Degree	Bachelor's Degree	Associate's Degree	Voc-tech Degree
N = 548	*N* = 237	*N* = 672	*N* = 74	*N* = 10

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

Professional Degree	Master's Degree	Bachelor's Degree	Associate's Degree	Certification or Some College	High School Grad or Less
N = 135	*N* = 224	*N* = 531	*N* = 167	*N* = 260	*N* = 218

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	Montana	26%	26%	24%	23%	23%
	Nation	23%	23%	22%	22%	22%
N Count	Montana	805	821	802	1,080	1,046
	Nation	176,490	183,857	195,098	200,461	208,520

Overall STEM Interest (*N* = 1,046)

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* = 413)

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	Montana *N* Counts and Percents			
	Overall STEM Interest*		Expressed and Measured Only	
	N Count	Percent	*N* Count	Percent
Agronomy and Crop Science	19	3	4	1
Animal Sciences	71	10	26	6
Astronomy	19	3	14	3
Atmospheric Sciences and Meteorology	3	0	1	0
Biochemistry and Biophysics	44	6	34	8
Biology, General	122	18	90	22
Cell/Cellular Biology	18	3	16	4
Chemistry	44	6	33	8
Ecology	17	2	11	3
Environmental Science	10	1	6	1
Food Sciences and Technology	7	1	2	0
Forestry	20	3	5	1
Genetics	14	2	9	2
Geological and Earth Sciences	19	3	16	4
Horticulture Science	7	1	4	1
Marine/Aquatic Biology	45	6	27	7
Microbiology and Immunology	12	2	10	2
Natural Resources Conservation, General	30	4	8	2
Natural Resources Management	2	0	1	0
Physical Sciences, General	31	4	24	6
Physics	29	4	24	6
Science Education	5	1	3	1
Wildlife and Wildlands Management	58	8	18	4
Zoology	50	7	27	7
Totals	696		413	

* 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 2%.

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

		2011	2012	2013	2014	2015
Percent	Montana	7%	7%	8%	10%	9%
	Nation	9%	9%	9%	10%	11%
N Count	Montana	230	229	266	456	408
	Nation	73,298	74,959	82,197	89,755	101,144

Overall STEM Interest (*N* = 408)

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* = 66)

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	Montana *N* Counts and Percents			
	Overall STEM Interest*		Expressed and Measured Only	
	N Count	Percent	*N* Count	Percent
Actuarial Science	0	0	0	0
Applied Mathematics	5	2	1	2
Business/Management Quantitative Methods, General	30	12	0	0
Computer and Information Sciences, General	44	17	15	23
Computer Network/Telecommunications	5	2	1	2
Computer Science and Programming	85	33	32	48
Computer Software and Media Application	24	9	6	9
Computer System Administration	4	2	0	0
Data Management Technology	1	0	0	0
Information Science	1	0	1	2
Management Information Systems	3	1	1	2
Mathematics Education	27	10	5	8
Mathematics, General	21	8	1	2
Statistics	4	2	2	3
Webpage Design	4	2	1	2
Totals	258		66	

* 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 stayed the same.

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

		2011	2012	2013	2014	2015
Percent	Montana	40%	41%	40%	38%	40%
	Nation	45%	45%	44%	43%	42%
N Count	Montana	1,226	1,286	1,341	1,775	1,836
	Nation	350,458	361,047	383,555	388,653	393,085

Overall STEM Interest (*N* = 1,836)

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* = 740)

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	Montana *N* Counts and Percents			
	Overall STEM Interest*		Expressed and Measured Only	
	N Count	Percent	*N* Count	Percent
Athletic Training	152	9	42	6
Chiropractic (Pre-Chiropractic)	15	1	6	1
Dentistry (Pre-Dentistry)	50	3	13	2
Emergency Medical Technology	21	1	6	1
Food and Nutrition	36	2	10	1
Health/Medical Technology, General	65	4	31	4
Medical Laboratory Technology	7	0	6	1
Medical Radiologic Technology	72	4	33	4
Medicine (Pre-Medicine)	313	19	190	26
Nuclear Medicine Technology	2	0	1	0
Nursing, Practical/Vocational (LPN)	69	4	22	3
Nursing, Registered (BS/RN)	363	22	186	25
Optometry (Pre-Optometry)	12	1	3	0
Osteopathic Medicine	1	0	0	0
Pharmacy (Pre-Pharmacy)	88	5	44	6
Physical Therapy (Pre-Physical Therapy)	176	11	61	8
Physician Assisting	33	2	12	2
Respiratory Therapy Technology	4	0	1	0
Surgical Technology	17	1	9	1
Veterinarian Assisting/Technology	25	2	9	1
Veterinary Medicine (Pre-Vet)	103	6	55	7
Totals	1,624		740	

* 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 1%.

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

		2011	2012	2013	2014	2015
Percent	Montana	27%	25%	29%	30%	28%
	Nation	23%	23%	24%	25%	25%
N Count	Montana	835	796	978	1,396	1,299
	Nation	180,295	184,644	207,344	220,815	236,300

Overall STEM Interest (*N* = 1,299)

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* = 365)

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	Montana *N* Counts and Percents			
	Overall STEM Interest*		Expressed and Measured Only	
	N Count	Percent	*N* Count	Percent
Aeronautical/Aerospace Engineering Technology	7	1	5	1
Aerospace/Aeronautical Engineering	40	4	15	4
Agricultural/Bioengineering	10	1	5	1
Architectural Drafting/CAD Technology	12	1	2	1
Architectural Engineering	21	2	8	2
Architectural Engineering Technology	2	0	1	0
Architecture, General	68	7	13	4
Automotive Engineering Technology	32	3	8	2
Biomedical Engineering	19	2	13	4
Chemical Engineering	68	7	43	12
Civil Engineering	69	7	28	8
Civil Engineering Technology	8	1	1	0
Computer Engineering	28	3	9	2
Computer Engineering Technology	6	1	1	0
Construction Engineering/Management	22	2	5	1
Construction/Building Technology	10	1	2	1
Drafting/CAD Technology, General	11	1	5	1
Electrical, Electronic, and Communication Engineering	43	4	17	5
Electrical/Electronics Engineering Technology	17	2	7	2
Electromechanical/Biomedical Engineering Technology	0	0	0	0
Engineering (Pre-Engineering), General	221	22	87	24
Engineering Technology, General	29	3	7	2
Environmental Control Technologies	2	0	2	1
Environmental Health Engineering	14	1	6	2
Industrial Engineering	19	2	5	1
Industrial Production Technologies	3	0	1	0
Mechanical Drafting/CAD Technology	7	1	3	1
Mechanical Engineering	160	16	44	12
Mechanical Engineering Technology	22	2	3	1
Military Technologies	30	3	12	3
Nuclear Engineering	10	1	6	2
Quality Control and Safety Technologies	0	0	0	0
Surveying Technology	1	0	1	0
Totals	1,011		365	

* 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.

Montana 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

- 4,589 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

- 1,584 graduates have an expressed and measured interest in STEM, which is 35% of the overall interest.

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

Montana 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

Montana 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

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