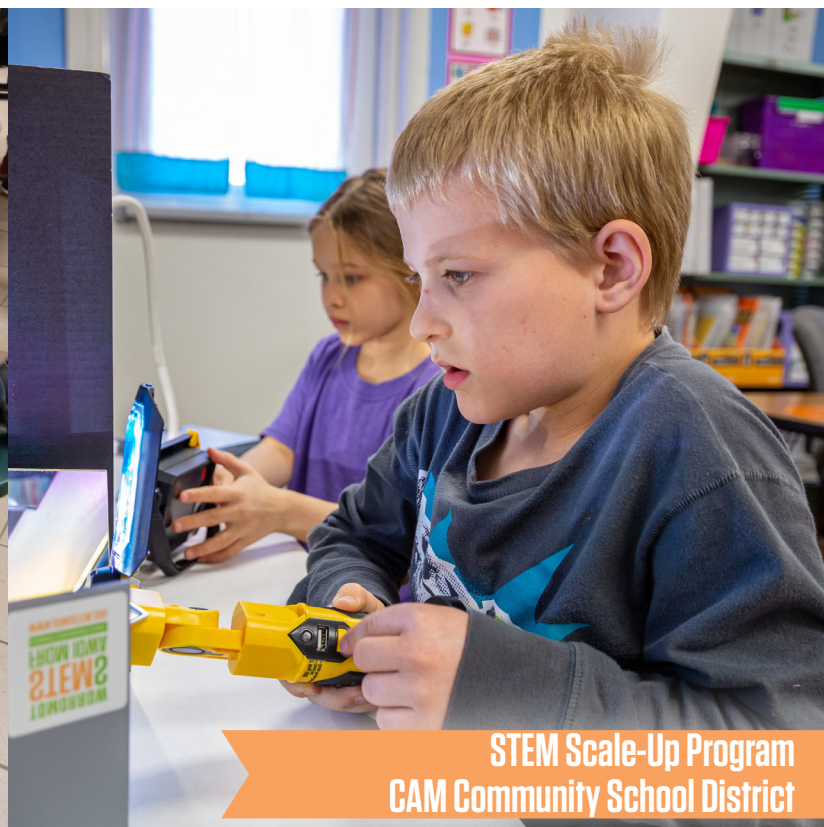


# Iowa STEM Evaluation Report

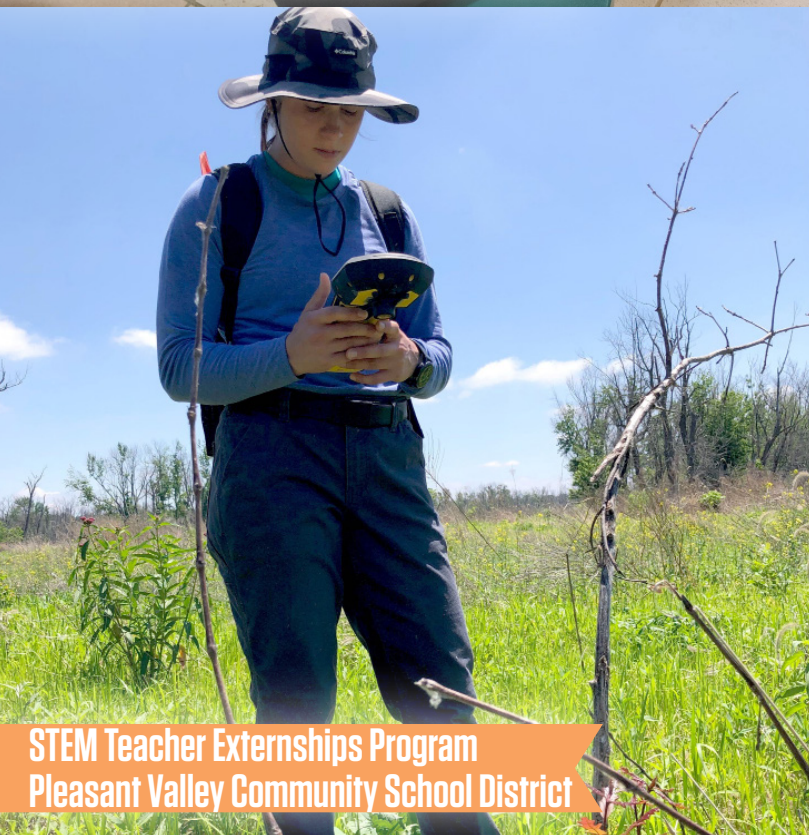
## 2020-2021



Computer Science is Elementary  
Storm Lake Community School District



STEM Scale-Up Program  
CAM Community School District



STEM Teacher Externships Program  
Pleasant Valley Community School District



STEM BEST Program  
Cedar Falls Community School District



# IOWA STEM INDICATORS

These indicators are provided by the external evaluation team consisting of University of Northern Iowa's Center for Social and Behavioral Research, Iowa State University's Research Institute for Studies in Education, The University of Iowa's Iowa Testing Programs and Center for Evaluation and Assessment.



## 2020-2021 HIGHLIGHTS

### STEM Education

- Minority students enrolled in STEM coursework increased by +6.9 percentage points in mathematics, +6.8 in science and +1.8 in technology in the last eight years.
- From 2012-13 to 2019-20, the number of certificates and diplomas at 2-year institutions increased by 5%, at 4-year public institution by 50%, and at 4-year private institutions by 20%.
- Upon graduating and enrolling in an Iowa public university, students who participated in the STEM Scale-Up Program were 18 percentage points more likely to major in STEM than their peers.<sup>1</sup>

### STEM Careers

- 64% of collegians who took part in a STEM BEST Program are in STEM programs.<sup>2</sup> That's more than twice the national rate.<sup>3</sup>
- The majority of Iowa's employment (58%), labor output (71%) and state gross domestic product (65%) is supported by STEM.<sup>4</sup>
- In 2020, individuals in STEM occupations earned on average \$70,250 in mean salaries compared to all occupations overall earning \$47,334 in mean salaries.

### STEM Interest

- Educators who took part in the STEM Scale-Up Program increased their confidence to teach STEM topics (93%) and are better prepared to answer students' STEM-related questions (90%).
- 95% of surveyed Iowans said STEM education should be a priority in their local school district. Only 58% said STEM education actually is a priority.
- The percentage of students saying they wish to live and work in Iowa upon completing their studies is 8 percentage points higher for those who took part in the STEM Scale-Up Program.

1- Source: *STEM Scale-Up Participants Report produced by Iowa's State Longitudinal Data System (2021)*

2- Source: *TouchPoints Where Are They Now Report (2022)*

3- Source: [https://nces.ed.gov/programs/raceindicators/indicator\\_reg.asp](https://nces.ed.gov/programs/raceindicators/indicator_reg.asp) (2019)

4- Source: "STEM and the American Workforce: An Inclusive Analysis of The Jobs, GDP and Output Powered By Science and Engineering." (2020)

The STEM Scale-Up Program provides high-quality STEM education programs to PreK-12 youth in school and out of school along with training for educators to implement effectively.

A total of **1,506 educators** delivered at least one of thirteen world class STEM Scale-Up Programs in 2020–2021.

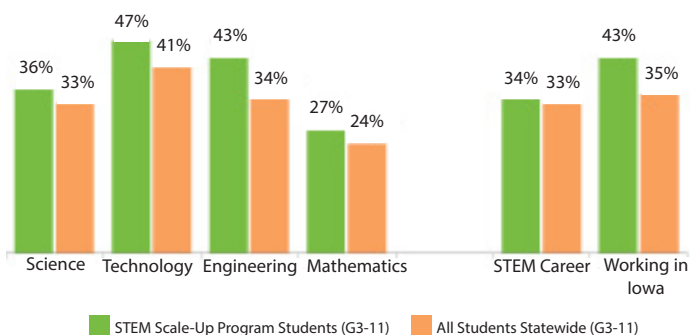
An estimated **71,913 PreK–12 youth** participated in one or more STEM Scale-Up Programs in 2020–2021.

Since 2012, more than one million **PreK–12 Iowans** have participated in STEM Scale-Up Programming.

Of educators taking part in STEM Scale-Up Programming, **93% agreed or strongly agreed** they now have more confidence to teach STEM topics and **94%** have increased their STEM knowledge.

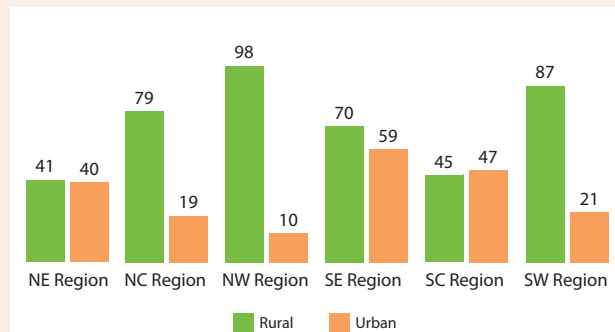
More than half the total annual legislative appropriation to Iowa STEM is devoted to the STEM Scale-Up Program.

## STUDENT INTEREST IN STEM



A higher proportion of students who participated in a STEM Scale-Up Program said they were “**very interested**” in all STEM subjects and in pursuing a STEM career compared to all students statewide.

## RURAL AND URBAN AWARDS



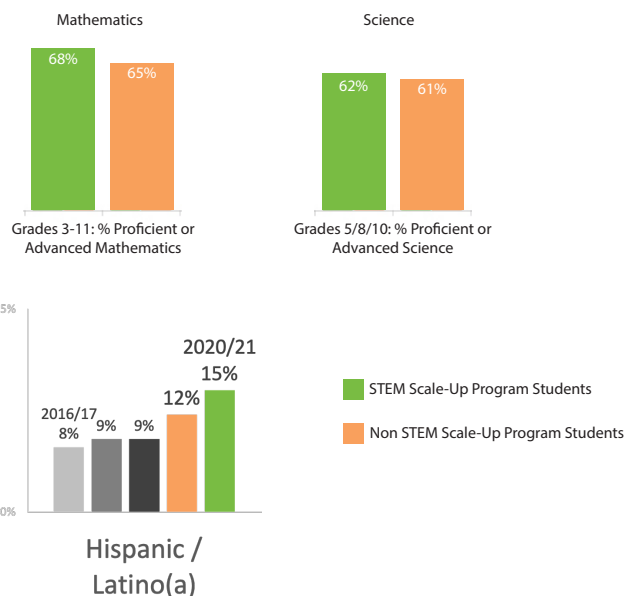
Urban communities include 49 communities in Iowa listed as “urbanized areas” by the U.S. Census Bureau and communities with a population of 20,000 or greater.

## STUDENT ACHIEVEMENT AT PROFICIENT OR ADVANCED LEVEL

Students who participated in the STEM Scale-Up Program performed better on statewide tests than students who did not receive STEM Scale-Up Programming. This is consistent among students of all gender and race subgroups.

In 2020–2021, STEM Scale-Up Program participants in grades 3 through 11 scored an average of 3 points higher in mathematics and 1 point higher in science.

In the last five years, the STEM Scale-Up Program has increased participation among students who are Hispanic/Latino(a) from 8% to 15%.



School+business partnerships that provide career-linked learning experiences for students.



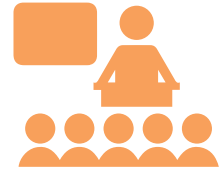
Twelve new STEM BEST Program partnerships were established in 2020–2021, involving 12 school districts and 72 community partners. A total of 73 STEM BEST models have been established between 2014–2021.



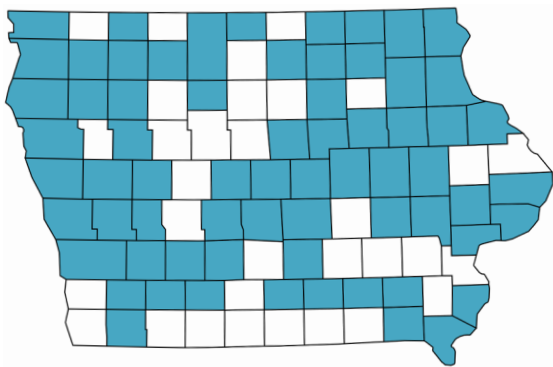
Estimated cost-share dollars contributed in 2020–2021 collectively totals more than \$358,000.

73%

of all STEM BEST Program models are serving rural Iowa school districts.



An additional 1,907 students participated in STEM BEST Program from newly established models in 2020–2021.



■ = STEM BEST® model located in the county

**67%** of Iowa's counties have a STEM BEST® Program.

## STEM BEST Program Partnerships



**455 Business/Industry Partners** have worked with STEM BEST® models between 2014–2021.



**112 Government Partners** have worked with STEM BEST® models between 2014–2021.



**60 Education Partners** have worked with STEM BEST® models between 2014–2021.



**38 Non-Profit Partners** have worked with STEM BEST® models between 2014–2021.

## STEM BEST Program Examples



**LEWIS CENTRAL COMMUNITY SCHOOL DISTRICT:** This after school STEM BEST Program model engages students in looking at waste and recycling through a different lens. Students utilize recycled plastics and create and design custom made products.



**NORTH FAYETTE VALLEY COMMUNITY SCHOOL DISTRICT:** The STEM BEST Program model created an off campus space to facilitate student-led projects that were proposed by more than a dozen community partners, including industrial technology, computer technology, business knowledge, communications and media technology, and professionalism.



**PELLA COMMUNITY SCHOOL DISTRICT:** The STEM BEST Program model assembled classroom teachers and industry professionals to build a STEM curriculum for classrooms in grades 3–12 in the form of demonstration modules and web-based simulations.

Connecting classrooms to careers through the immersion of secondary STEM educators engaged in workplace settings for six weeks in the summer.

Total STEM Teacher  
Externships  
2009 to 2021

**697**

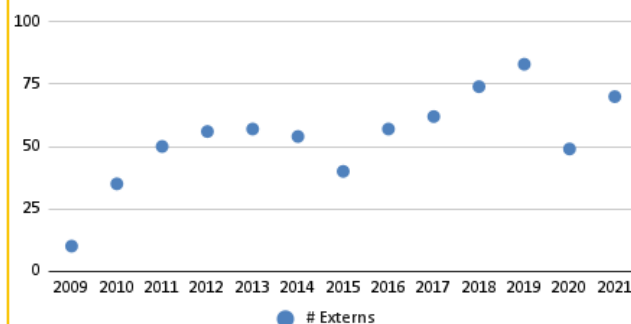
Total Workplace  
Partners  
2009 to 2021

**203**

Total approximate  
cost share by  
workplace hosts  
from 2009 to 2021

**\$1,056,600**  
(\$102,000 this year)

## Annual Participation in Externships



Of 2021 employers surveyed, most monetized the value of the project(s) completed by the STEM Teacher Extern between \$2,501-\$5,000.

### 2021 STEM Teacher Externs indicated more confidence with the following aspects of teaching:

- Ability to advise students about job opportunities in their subject area(s)
- Ability to prepare students for the expectations they will encounter in the workplace
- Mastery of subject-area content
- Knowledge about the application of their subject(s) in the workplace
- Ability to use problem or project-based instruction

## Computer Science is Elementary

**12** high-poverty elementary schools in Iowa serve as showcases of outstanding computer science education and implement computer science cross-curricularly.

**60%** of the schools surveyed reached all students with computer science education at their school.

▲ Student participation increased in most elementary schools between 2019-2020 and 2020-2021.

**220+** teachers were reported as providing computer science instruction.

**4,700+** students were impacted by Computer Science is Elementary.

Computer Science is Elementary project participants indicated the following areas of impact:



**Schoolwide fondness** of computer science education



**Increased computer science education** in classrooms



**Increased school building engagement** for computer science projects



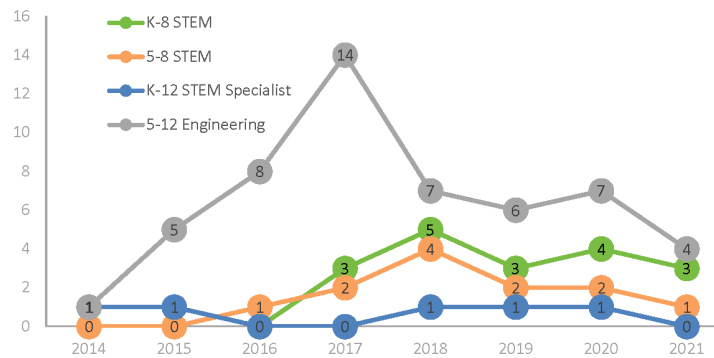
**Positive impact on student energy** towards learning



**Expanded and enhanced** curricular offerings

# STEM TEACHER ENDORSEMENTS

Grades K-8 and 5-8 STEM teaching endorsements are now offered at eight institutions in Iowa: Buena Vista University, Central College, Drake University, Dordt University, Grand View University, Morningside College, St. Ambrose University and the University of Northern Iowa. A total of 58 Iowa educators are endorsed in STEM and 86 in engineering.



Since 2014, **262** STEM endorsements have been granted:

- **20** for K-8 STEM
- **12** for 5-8 STEM
- **5** for K-12 STEM Specialist
- **52** for 5-12 Engineering

In 2021, 8 STEM endorsements were granted:

- **3** for K-8 STEM
- **1** for 5-8 STEM
- **4** for 5-12 Engineering

## MICROSOFT IMAGINE ACADEMY

A total of **15,088** Microsoft Imagine Academy student certifications have been awarded since 2014.

A total of **1,022** certifications were awarded in 2020-2021.

Plus, **32,032** student exams.

[www.iowaSTEM.org/MITA](http://www.iowaSTEM.org/MITA)

**438** ▶ Microsoft Technology Associate certifications earned since 2014.

**265** ▶ teachers are participating.

**14** ▶ Microsoft Fundamentals certifications.

**150** ▶ high schools and community colleges are participating.

# STEM COMMUNICATIONS

## SOCIAL MEDIA



Twitter: **3,960** followers  
Up **2.5%** from last year



Facebook: **1,654** likes  
Up **8%** from last year



Instagram: **661** followers  
Up **26%** from last year



YouTube: **6,898** views  
**55,900** impressions  
Up **11%** from last year



Newsletter: **7,309** readers  
Up **2.3%** from last year



LinkedIn: **518** followers  
Up **12%** from last year

Other social media includes Pinterest.

## WEBSITE

[www.iowaSTEM.org](http://www.iowaSTEM.org)

**99,042** page views  
Down **4%** from last year

**35,142** new visitors  
Up **10%** from last year

**53,352** sessions  
Up **3%** from last year



**141** countries



**52** states and territories



**285** Iowa cities

## MEDIA COVERAGE

Total public relations efforts resulted in **121 placements** (down 38% from last year) in newspaper, television and radio outlets over the course of the year in local, statewide and national media coverage, appearing before potentially **30 million** eyes (down 48% from last year.) Media placement and coverage reflects the disruption caused by the pandemic.

**30%** of media coverage included a specific STEM Council example or story in the state. Down 3% from last year.

**98%** of media coverage mentioned the efforts of the Iowa Governor's STEM Advisory Council. Down 1% from last year.

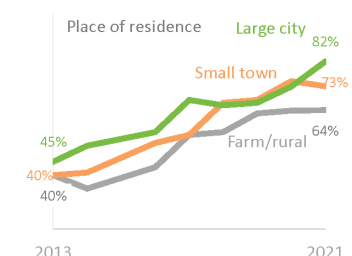
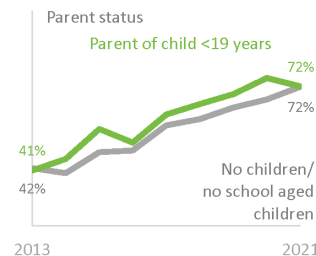
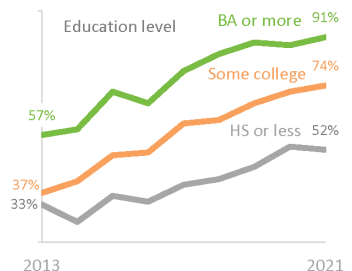
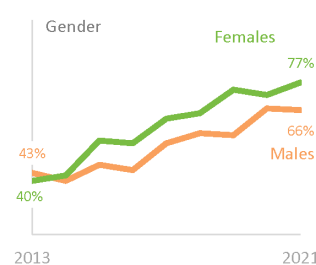
## PUBLIC ATTITUDES AND AWARENESS OF STEM

Nearly three-fourths of Iowans (72%) had heard of the acronym STEM. This is an increase of 46 percentage points compared to 2013.

Only 58% said STEM education actually is a priority and another 12% said they didn't know if STEM education was a priority in their local school district.

86% of Iowans support state efforts to devote resources and develop initiatives to promote STEM education in Iowa.

Approximately 5 out of 10 Iowans agreed the quality of STEM education in Iowa is high.



In 2021, 95% of Iowans agreed that STEM education should be a priority in their local school district.



# IOWA'S STEM NETWORK

## CORPORATE PARTNERS AND INVESTMENTS

**\$1.1 MIL**

A total of **\$1,109,706** in grants, corporate partner gifts and cost-sharing by other STEM partners was invested in Iowa STEM for 2020–2021.

**\$192K**

**22** corporate partners contributed **\$192,430** to Iowa STEM in 2020–2021. Investors are listed at [www.iowaSTEM.org/corporate-partners](http://www.iowaSTEM.org/corporate-partners).

**\$45K**

A total of **\$45,370** in grants from the Iowa Department of Natural Resources supported Iowa STEM in 2020–2021.

**\$871K**

Cost-sharing partners, including Strategic America, Regional STEM Hub Institutions, STEM Teacher Externship workplace hosts, STEM BEST partners and STEM Scale-Up Program providers contributed **\$871,906** to Iowa STEM in 2020–2021.

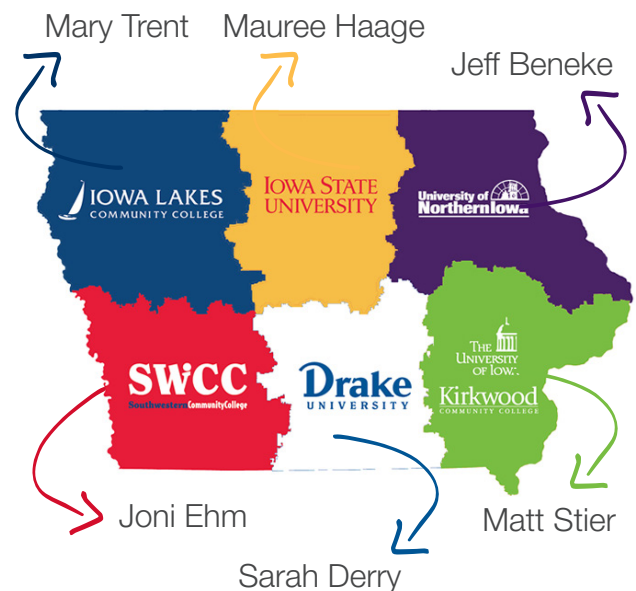
## REGIONAL STEM

Regional STEM managers facilitated 13 STEM Scale-Up Programs that impacted 71,913 PreK–12 youth and 1,506 educators in 2020–2021.

Managers held a total of 42 community STEM Festivals across Iowa, engaging more than 22,054 Iowans in 2020–2021.

Managers made a total of 1,325 new connections with businesses, workforce development, economic development and formal/informal education leaders.

Collectively, Iowa's Regional STEM managers have 18,171 newsletter subscribers, 5,991 Twitter followers and 3,002 Facebook likes.



TOMORROW  
STEMS  
FROM IOWA

IOWA STEM TEACHER  
AWARD

Proudly Sponsored by: KEMIN

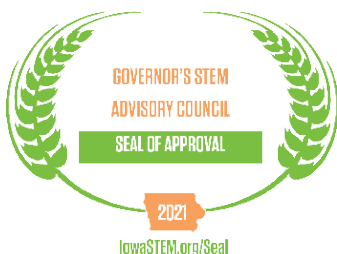
[www.iowaSTEM.org/TeacherAward](http://www.iowaSTEM.org/TeacherAward)

**42**

have received the  
Iowa STEM Teacher  
Award between  
2015-2021

+

Most awardees believe the recognition has a lasting effect on students', parents' and colleagues' confidence in their teaching



**25**

programs have  
earned the Seal of  
Approval between  
2015-2021

+

Most report that the recognition validates their program or event and helps in grant proposals or other source funding





**University of  
Northern Iowa**

Center for Social &  
Behavioral Research



**Iowa Testing Programs**

# Iowa STEM Monitoring Project

## 2020-2021 Annual Report

**Report No. 9.1  
May 2022**

**Prepared for**  
Iowa Governor's STEM Advisory Council



**Prepared by**  
Erin O. Heiden, PhD, MPH  
Justin Szabo, PhD  
Andrew Guhin, MS  
Matthew Whittaker, PhD  
Mary E. Losch, PhD  
Catherine Welch, PhD

## Acknowledgements

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*The opinions, findings, and conclusions expressed in this publication are those of the authors and not necessarily those of the Governor of Iowa, the Iowa Governor's STEM Advisory Council, or The University of Northern Iowa.*

*The authors would like to thank the many individuals and organizations who contributed to this report. This includes great cooperation and data sharing from several "partners in STEM" at ACT, Inc., the Iowa Department of Workforce Development, and the Iowa Department of Education. In addition, several staff and students at Iowa State University, The University of Iowa, and the University of Northern Iowa made valuable contributions to this effort. For their valuable assistance, we say a special thanks to Aaron Vincent, Ki Park, Thomas Turner, Sharon Cory, Rod Muilenburg, and the CATI lab supervisors. We would also like to recognize our student telephone interviewers who collected data. Finally, we especially thank the over 1,000 participants of the statewide survey and 900 Scale-Up educators who shared their time, views, and personal experience about STEM efforts and programming in Iowa. Their generosity of time and thoughtful reflections make this report possible.*

*For additional information about this project, contact:*

Jeff Weld, PhD, Executive Director  
Iowa Governor's STEM Advisory Council  
214 East Bartlett Hall | University of Northern Iowa  
Cedar Falls, IA 50614-0298  
319.273.2723 | [www.iowaSTEM.org](http://www.iowaSTEM.org) | [weld@iowastem.org](mailto:weld@iowastem.org)

*For additional information about this report, contact:*

Erin O. Heiden | Assistant Director  
Center for Social and Behavioral Research | University of Northern Iowa  
Cedar Falls, IA 50614-0402  
319-273-2105 | [www.uni.edu/csbr/](http://www.uni.edu/csbr/) | [erin.heiden@uni.edu](mailto:erin.heiden@uni.edu)

*Author Information:*

Erin O. Heiden, PhD, Assistant Director, Center for Social and Behavioral Research (UNI)  
Justin Szabo, MS, Research Scientist II, Research Institute for Studies in Education (ISU)  
Andrew Guhin, MS, Research Scientist II, Research Institute for Studies in Education (ISU)  
Matthew Whittaker, PhD, Associate Research Scientist, Iowa Testing Programs, College of Education (UI)  
Mary E. Losch, PhD, Director, Center for Social and Behavioral Research (UNI)  
Catherine Welch, PhD, Co-Director, Iowa Testing Programs, College of Education (UI)

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# Executive Summary

---

The Iowa STEM Monitoring Project (ISMP) is a multi-faceted and collaborative effort that works in support of the Iowa Governor's STEM Advisory Council. Established in 2011, the Iowa Governor's STEM Advisory Council mission is increasing interest and achievement in STEM (science, technology, engineering and mathematics) studies and careers through partnerships engaging preK-12 students, parents, educators, employers, non-profits, policy leaders and others. The Council provides opportunities that inspire Iowa's young people to become innovative, enterprising contributors to Iowa's future workforce and the quality of life in Iowa's communities

The Iowa STEM Monitoring Project is conducted by an external collaboration of partners from Iowa's three Regents institutions: the University of Northern Iowa Center for Social and Behavioral Research, the Iowa State University Research Institute for Studies in Education, and Iowa Testing Programs at The University of Iowa. The purpose of the ISMP is to systematically collect a set of metrics and information sources used to examine changes regarding STEM education and workforce development in Iowa centered on the activities of the Iowa Governor's STEM Advisory Council. The ISMP report is organized into three sections: 1) STEM Scale-Up Program; 2) Iowa STEM Indicators, and 3) Statewide Survey of Public Attitudes toward STEM.

## STEM Scale-Up Program

The STEM Scale-Up Program provides high-quality STEM education professional development and curriculum to educators in schools, after-school programs, and other settings for youth in grades pre-kindergarten through 12. The STEM Scale-Up Program was monitored using two sources of information that were expected from all schools/organizations implementing a STEM Scale-Up Program: 1) an educator survey and 2) a student participant list.

In 2020-2021, a total of 1,506 STEM Scale-Up programs were awarded with some educators receiving more than one program. Over nine hundred educators (n=929) completed an educator survey, and information was submitted on 17,124 student participants. Participant information was matched to student records to summarize demographics characteristics of student participants.

- **The 2020-2021 STEM Scale-Up year had the highest proportion ever of Hispanic participants (15%), which had previously averaged 7% per year (range: 3%-12%, 2013-2020).** Overall, the distribution of Scale-Up students by race/ethnicity was 77% White, 15% Hispanic, 3% Black/African American, and 6% all other races combined. By gender, Scale-Up student participants were 48% female and 52 % male.

## Interest and Achievement in STEM among STEM Scale-Up Student Participants

- **More students who participated in a STEM Scale-Up program said they were interested in science, technology, engineering, and mathematics, and in working in a STEM career compared to all students statewide.** Approximately, 47% of Scale-Up participants said they

were *very interested* in technology, and 43% said the same for engineering compared to 41% and 34%, respectively, among students statewide. On the Iowa Statewide Assessment of Student Progress (ISASP), STEM Scale-Up Program participants performed better compared to all students statewide.

- **In 2020-2021, STEM Scale-Up Program participants performed better on the Iowa Statewide Assessment of Student Progress (ISASP) in *mathematics* (+3 percentage points) and *science* (+1 percentage point) compared to all students statewide.** Achievement scores by race/ethnicity showed that for minority students, +2% more STEM Scale-Up Program participants met Proficient or Advanced level benchmarks in *science* compared to minority students who did not participate; however, this trend was not observed in *mathematics* achievement among minority students.

### Educator Perceptions of STEM Scale-Up Program Implementation and Outcomes

- To prepare for implementing their Scale-Up programs, educators were required to complete a virtual professional development (PD) training. **Nine in ten respondents indicated the PD met or exceeded expectations** in several areas including in preparation for implementation, in building confidence to implement, and in learning about available resources and support during implementation.
- Over two-thirds (67%) of educators were able to implement their programs in whole or in-part. Among all respondents, **approximately 30% did not implement their programs** (25% because of pandemic-related reasons and five percent for other reasons). **Among educators who did not implement due to the pandemic, nearly 80% plan to do so next year.**
- Over 90% of responding educators indicated that they had either *all of the time* or *most of the time* received materials and resources in a timely manner and that the program provider was responsive to questions and needs.
- Educators in both formal and informal education settings reported that they gained skills and confidence in teaching STEM topics as a result of their participation in the STEM Scale-Up Program. **The majority of educators agreed or strongly agreed that the program increased their knowledge of STEM topics (94%), gave them more confidence to teach STEM topics (93%), helped them learn effective methods for teaching in STEM-content areas (92%), and that they now are better prepared to answer students' STEM-related questions (90%).**
- **Seven in ten educators (73%) reported an increase in student interest in STEM topics, and nearly six in ten (57%) reported an increase in student awareness. Over one-third (37%) indicated an increase in student achievement in STEM areas.**
- Nearly all responding educators (94%) reported that they will be using the program with their students again next year.

### Iowa STEM Indicators

Iowa STEM indicators track publicly available data at national and state levels on a variety of STEM topics in education and workforce development across four primary areas of focus: 1) STEM



achievement and interest among K-12 students, 2) STEM preparation of preK-12 students, 3) Post-secondary enrollment and training in STEM fields, and 4) STEM employment. Delayed reporting due to the ongoing effects of the pandemic limited the ability to report on all indicators in 2020-2021.

#### STEM achievement and interest among K-12 students

In **mathematics achievement**, the percentage of students in grades 4<sup>th</sup>, 8<sup>th</sup>, and 11<sup>th</sup> who were at or above proficiency **decreased** from 2018-2019 to 2020-2021. In 2020-2021, 66% of students in 4<sup>th</sup> grade, 68% of students in 8<sup>th</sup> grade, and 64% of students in 11<sup>th</sup> grade were proficient or above compared to 72%, 72%, and 67% in 2018-2019, respectively (Indicator 1).

In **science achievement**, the percentage of students in grades 5<sup>th</sup>, 8<sup>th</sup>, and 10<sup>th</sup> who were at or above proficiency **increased** from 2018-2019 to 2020-2021. In 2020-2021, 54% of students in 5<sup>th</sup> grade, 64% of students in 8<sup>th</sup> grade, and 63% of students in 10<sup>th</sup> grade were proficient or above compared to 51%, 58%, and 62%, respectively (Indicator 1).

Among all students statewide, interest in individual STEM topics or in pursuing STEM careers started high in 2012-2013 and remained high through 2020-2021. **Over 75% of all students statewide indicated they were “very interested” or “somewhat interested” in science, technology, engineering, or in pursuing a STEM career in 2020-2021.** Just less than seven in ten (67%) said they were “very interested” or “somewhat interested” in mathematics (Indicator 3).

#### STEM preparation of K-12 students

The percentage of underrepresented minority students enrolled in STEM-subject areas has typically increased annually in the last eight years. **Enrollment by underrepresented minority students in science has increased by +6.8 percentage points, +1.8 in technology, +6.9 in mathematics, and +5 in health.** Underrepresented minority student enrollment in engineering decreased (-3.1 points) in that same time period (Indicator 5).

In the past six years, the number of concurrent enrollment courses taken by high school students has increased 13% for mathematics courses (9,678 courses taken in 2020-2021) and 13% for science courses (4,105 courses taken in 2020-2021) (Indicator 7).

**Since 2014, 262 endorsements have been granted: 20 for K-8 STEM, 12 for 5-8 STEM, five for K-12 STEM Specialist, 52 for 5-12 Engineering, and 173 for 5-12 CTE Information Technology.** Eight Iowa colleges and universities currently offer K-8 and 5-8 STEM endorsements: Buena Vista University, Central College, Dordt University, Drake University, Grandview University, Morningside College, Saint Ambrose University, and the University of Northern Iowa (Indicator 8).

## STEM college completions

In 2021, 5,285 students enrolled in Iowa's community colleges in degree fields categorized by career clusters in architecture and construction, information technology, and STEM. An additional 10,936 students were enrolled in health sciences. Overall, the total number of awards in STEM-related degree fields from Iowa's community colleges increased 20% from 2013 to 2021. Notably in 2021, awards to minority graduates increased 63% compared to 2013. (Indicator 9).

From academic year 2012-2013 to 2019-2020, there has been a 50% increase at 4-year public, and a 20% 4-year private (not-for-profit) colleges and universities, respectively (Indicator 10)

## STEM employment

On average in 2020, individuals in STEM occupations earned \$33.77 mean wages and \$70,250 in mean salaries, compared to all occupations overall earning \$22.76 in mean wages and \$47,334 in mean salaries, respectively (Indicator 11).

## Statewide Survey of Public Attitudes toward STEM

To assess change in public awareness and attitudes toward STEM, a statewide public survey of Iowans was conducted from June to October 2021. Over 1,000 Iowans participated in a statewide STEM survey, and results were weighted to obtain point estimates that are representative of the adult population of Iowans.

In 2021, 72% of Iowans had heard of the acronym STEM. This was a net increase of +31 points from 2013. A greater percentage of Iowans with some college (74%) or with a BA or more (91%) reported having heard of STEM compared to Iowans with a high school degree or less (52%,  $p < .01$ ). No other subgroup differences in awareness were observed.

Respondents were asked about groups and events promoting STEM in the state, as well as awareness of the slogans *Greatness STEMs from Iowans* and *Tomorrow STEMs from Iowans*. In 2021, an estimated 42% of Iowans had heard about a STEM event or programming in their local school district. About one-quarter of Iowans (24%) reported they had heard of the Governor's STEM Advisory Council or STEM Day at the Iowa State Fair (23%). Almost one in five Iowans had heard of Iowa STEM BEST school-business partnerships (18%). An estimated 14% of Iowans reported having heard the slogan *Greatness STEMs from Iowans*, and 10% recognized *Tomorrow STEMs from Iowans* at the time of the public awareness survey in summer/fall 2021.

In 2021, nine in ten Iowans (95%) said STEM education should be a priority in their local school district. Only 58% said STEM education actually is a priority, and another 12% said they did not know if STEM education was a priority in their local school district. While there still is a discrepancy between what Iowans' view should be and is a priority, this has improved over time compared to 2015 when less than half (47%) said STEM education was a priority, and one in five (22%) did not know. Furthermore, nearly nine in ten Iowans (86%) support state efforts to devote resources and develop initiatives to promote

STEM education in Iowa. Five in ten Iowans (51%) agree with the statement, “Overall, the quality of STEM education in Iowa is high.” By subject area, nearly two-thirds of Iowans rated the quality of science, technology, and mathematics education in their community as ‘*Excellent*’ or ‘*Good*,’ while less than half (37%) of Iowans rated the quality of engineering education in their community that way.

## Conclusion

The 2020-2021 findings of the Iowa STEM Monitoring Project continued to reflect the ongoing impacts of the pandemic, but also heralded the return to in-person classroom instruction and hands-on activities and working with materials. The STEM Scale-UP Program provided over 1,500 opportunities to integrate STEM engagement and learning in formal and informal education settings across the state. Educators in both settings reported that they gained skills and confidence in teaching STEM topics as a result of their participation in the STEM Scale-Up programs. The Iowa STEM indicators continue to reflect the disruption caused by the pandemic with some data unavailable or delayed, and the historical effect of the pandemic within indicators is still yet to be fully understood. The ISMP will continue to follow these indicators, and identify and/or refine other metrics of STEM progress to be able to continue to assess the impacts of the efforts by the Iowa Governor’s STEM Advisory Council to improve STEM education and workforce development in the state.

# Section 1. STEM Scale-Up Program

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The STEM Scale-Up Program provides high-quality STEM education professional development and curriculum to educators in schools, after-school programs, and other settings for youth in grades pre-kindergarten through 12. More information about the STEM Scale-Up Programs can be found at [www.iowastem.org/Scale-Up](http://www.iowastem.org/Scale-Up).

Typically, educators apply for the STEM Scale-Up Program in the January preceding the academic year and are notified by April of their award. Program providers begin working with educators just as the school year is ending to prepare for program implementation during the next academic year (~July-May implementation). There are some exceptions to this timeline for programs (e.g. Curriculum for Agricultural Science Education (CASE) programs) whose professional development is held in the summer a full year after being awarded and/or informal implementation settings that occur during the summer months.

The STEM Scale-Up Program is monitored using two sources of information that were expected from all schools/organizations implementing a STEM Scale-Up Program: 1) an educator survey and 2) a student participant list.



## STEM Scale-Up Program awards

A total of 1,506 STEM Scale-Up programs were awarded in 2020-2021 (Table 1). This includes educators who received one or more STEM Scale-Up awards.

Table 1. Number of STEM Scale-Up Program awards by region, 2020-2021

	Total n	Number by STEM Region					
		NC	NE	NW	SC	SE	SW
<b>Total</b>	<b>1,506</b>	<b>286</b>	<b>244</b>	<b>242</b>	<b>224</b>	<b>321</b>	<b>189</b>
Bootstrap: Data Science	19	4	1	2	0	12	0
Computer Science Discoveries	26	1	3	5	9	6	2
Computer Science Fundamentals	49	20	2	5	3	11	8
Computer Science Principles	13	3	2	1	2	3	2
Curriculum in Agricultural Science Education (CASE): Agricultural Power and Technology <sup>1</sup>	6	2	1	0	0	1	2
Desmos Middle School Math	20	5	0	4	0	7	4
Differentiated Math Centers	516	144	40	104	68	112	48
Pint Size Science	380	33	151	47	59	51	39
PLTW: Cybersecurity	15	5	1	1	3	4	1
STEM in Action	260	28	23	49	36	78	46
STEM Innovator	54	16	9	3	7	16	3
VEX IQ Challenge	113	17	10	15	32	14	25
VEX V5	35	8	1	6	5	6	9

Source: Iowa Governor's STEM Advisory Council, Central Operations Office

1. Curriculum in Agricultural Science Education (CASE): Agricultural Power and Technology awards will be implemented and evaluated in 2021-2022.

According to records provided by the Iowa Governor’s STEM Advisory Council, Central Operations Office, an estimated 66,261 pre-kindergarten through 12<sup>th</sup> (PreK-12) grade students were projected to participate in the 2020-2021 STEM Scale-Up Program (Table 2). The largest programs included the Pint Size Science program (15,858 students), STEM in Action (14,627), and the Differentiated Math Centers (13,327). The remaining programs each had fewer than 10,000 students.

Table 2. Projected number of students participating in the STEM Scale-Up Program by region

STEM Scale-Up Program	Total n	Number by STEM Region					
		NC	NE	NW	SC	SE	SW
<b>Total</b>	<b>66,261</b>	<b>9,719</b>	<b>8,604</b>	<b>8,952</b>	<b>12,159</b>	<b>16,025</b>	<b>10,802</b>
Bootstrap: Data Science	744	120	67	140	0	417	0
Computer Science Discoveries	2,224	16	116	412	755	782	143
Computer Science Fundamentals	4,802	695	325	207	165	2,773	637
Computer Science Principles	385	91	35	20	49	90	100
Curriculum in Agricultural Science Education (CASE): Agricultural Power and Technology <sup>1</sup>	350	90	200	0	0	10	50
Desmos Middle School Math	1,202	260	0	225	0	482	235
Differentiated Math Centers	13,327	3,290	789	2,417	1,798	3,368	1,665
Pint Size Science	15,858	1,132	3,702	1,935	3,947	2,316	2,826
PLTW: Cybersecurity	322	110	10	30	56	66	50
STEM in Action	14,627	1,258	1,700	2,080	2,597	3,486	3,506
STEM Innovator	4,012	1,445	915	35	222	1,145	250
VEX IQ Challenge	6,374	1,027	735	1,275	1,615	755	967
VEX V5	2,034	185	10	176	955	335	373

Source: Iowa Governor’s STEM Advisory Council, Central Operations Office

1. Curriculum in Agricultural Science Education (CASE): Agricultural Power and Technology awards will be implemented and evaluated in 2021-2022.

## STEM Scale-Up Program Educator Survey

**Data source** Educator Survey, Iowa STEM Monitoring Project  
Provided by Research Institute for Studies in Education, Iowa State University

The Educator Survey is collected annually from educators who implement a STEM Scale-Up Program in their schools and organizations. This section highlights key findings from the full report available under separate cover.<sup>1</sup> Additional questions added to the educator survey in 2019-2020 about implementation during the global pandemic were maintained for 2020-2021. In 2020-2021, data were collected across all six STEM regions for the following 13 STEM Scale-Up programs:

### 2019-2020 STEM Scale-Up Programs evaluated in 2020-2021<sup>2</sup>

- Curriculum for Agricultural Science Education (CASE): Food Science and Safety

### 2020-2021 STEM Scale-Up Programs<sup>3</sup>

- Bootstrap: Data Science
- Computer Science Discoveries
- Computer Science Fundamentals
- Computer Science Principles
- Desmos
- Differentiated Math Centers
- Pint Size Science
- PLTW: Cybersecurity
- STEM in Action
- STEM Innovator
- VEX IQ Challenge
- VEX V5

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<sup>1</sup> cf. Guhin, A., Vincent, A., & Szabo, J. (2021). *Iowa STEM Monitoring Project, 2020-2021: Scale-Up Educator Survey*. Ames, IA: Iowa State University, Research Institute for Studies in Education.

<sup>2</sup> Curriculum for Agricultural Science (CASE) Scale-Up programs are implemented in the next academic year following the year of award and included in the evaluation of the current respective year.

<sup>3</sup> In addition to those listed, Curriculum for Agricultural Science (CASE): Agricultural Power and Technology is a 2020-2021 program that will be evaluated in 2021-2022 and reported in the FY22 annual report.

## Demographic characteristics of educator survey respondents

In 2020-2021, 1,367 STEM Scale-Up educators were sent an email invitation to complete the online educator survey. Valid surveys were completed and returned by 929 educators (68% response rate). Overall, 83% of educators reported that they were in-school educators, six percent responded that they were out-of-school (informal) educators, and less than one percent were curriculum coordinators, school administrators, or para-educators. An additional 10% responded that they were another type of educator.

Each of the six regions was represented. Nineteen percent (19%) of responding educators were from the Northwest region, 20% from the North Central region, 19% from the Northeast region, ten percent from the Southwest region, 13% from the South Central region, and 21% from the Southeast region (Total sum greater than 100% due to rounding).

Just less than one third (31%) of respondents reported implementing Differentiated Math Centers, followed by Pint Size Science (27%), and STEM in Action (18%). Seven percent or fewer respondents represented each of the remaining programs.

Together, respondents included educators who had implemented a STEM Scale-Up program at every grade level from pre-kindergarten (PreK) through 12th grade, respectively. The majority of respondents represented educators who had implemented their STEM Scale-Up program with students in either an early (PreK-2) or upper (3-5) elementary grade level.

## Key Findings

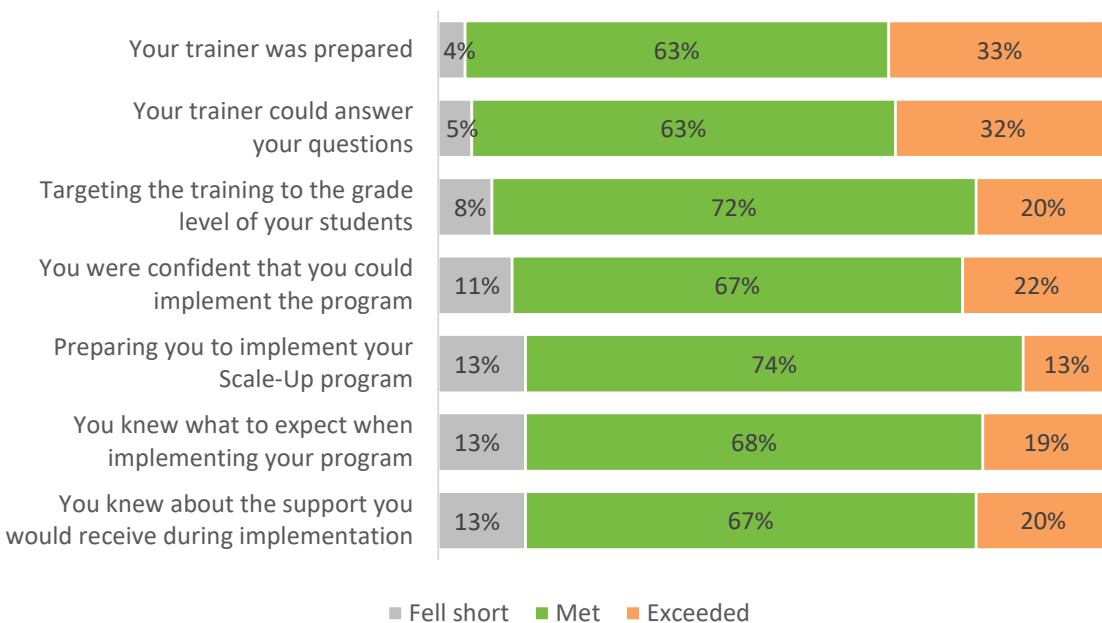
**Ongoing impact of pandemic** Among all respondents, approximately 25% did not implement their programs at all because of pandemic-related constraints, and an additional 22% implemented their programs with changes due to pandemic-related reasons. Educators who indicated that they implemented their programs with changes due to pandemic-related reasons were asked to describe what changes they made. The most common changes described related to the interaction patterns of students. Some educators reported having to use smaller groups for activities while others utilized larger group settings due to virtual instruction. Educators also described limited hands-on activities due to virtual instruction and/or restrictions placed on the classroom. Additionally, mask and distancing requirements provided an extra challenge to instructors. While most educators did implement the program in a modified way, a few indicated that they waited until spring to implement the program with the hope that pandemic restrictions (if any) would be less problematic.

**Completion of Professional Development** To prepare for implementing their STEM Scale-Up program, educators were required to complete a virtual professional development (PD) workshop. When asked whether they completed the workshop, 95% reported that they had. Reasons given by those (n=43) who did not complete the professional development included those who could not remember if they had participated (n=6) or had not yet had the opportunity to complete the PD (n=7). Others mentioned personal leave for maternity or illness (n=3), COVID-19-related factors or limitations related to teaching virtually (n=11), or other reasons (n=6).



Educators participating in the Computer Science Discoveries, Computer Science Fundamentals, and Computer Science Principles could opt to receive graduate credit or licensure renewal for participating in their program’s professional development; only a single individual responded to the question and indicated that they were aware of the option but did not pursue credits. Similarly, educators participating in Pint Size Science and STEM Innovator programs could opt to receive undergraduate or graduate credit for participating in their program’s professional development, as well as licensure renewal or CEUs. Over two-thirds (68%) of respondents of Pint Size Science or STEM Innovator programs (n=276) were aware of the options but declined to pursue credits and almost 19% were not aware of the option. Around 8% of respondents received licensure renewal and less than 3% each received CEUs, undergraduate, or graduate credits.

Educators reported that the professional development met or exceeded their expectations overall, with almost nine in ten respondents indicating that the professional development either met or exceeded their expectations in several areas (Figure 1). In particular, almost all respondents indicated the preparation of their trainers (96%) and their ability to answer questions (95%) met or exceeded expectations. Thirteen percent of respondents indicated that the PD fell short of their expectations in knowing what to expect when implementing the program and in knowing about the support they would receive during implementation.



Distributions not equal to 100% due to rounding.

Figure 1. Educator views on how well their expectations were met by the professional development

**Program Implementation** Nearly all (92%) respondents received their program materials on time. Among all respondents, about 30% did not implement their programs – 25% because of pandemic-related reasons and five percent for other reasons. Another three percent planned to implement their

programs during the following summer. Among respondents who reported having implemented their program (n=634), 50% did so as the program was designed, while 33% implemented with pandemic-related changes and almost 17% implemented with changes for another reason. Among educators who did not implement their programs (n=283), nearly 80% plan to do so next year.

In addition to the pandemic-related changes described previously, the majority of non-pandemic changes were made to adapt to student or classroom needs, including selecting individual units that were applicable to current curriculum and/or time constraints, modifying the material to the grade-level of students, and/or adapting implementation to an informal setting. In a few cases, educators indicated that the material was too complex for the abilities and/or group size of students, and had to be modified to make it more appropriate for the situation.

The majority of educators reported a positive experience working with their Scale-Up program providers (Figure 2). Over 90% indicated that they had either *all of the time* or *most of the time* received materials and resources in a timely manner and that the program provider was responsive to questions and needs. Eight in ten (85%) reported that the partnership with their program provider met their overall expectations. Almost half (49%) of respondents reported they stayed engaged with their program provider throughout the year either *most of the time* or *all of the time*, and another 28% stayed engaged *some of the time*. Considering educators' high ratings across the other indicators, this sometime engagement may have resulted from those who did not fully implement their programs or other unknown factors.

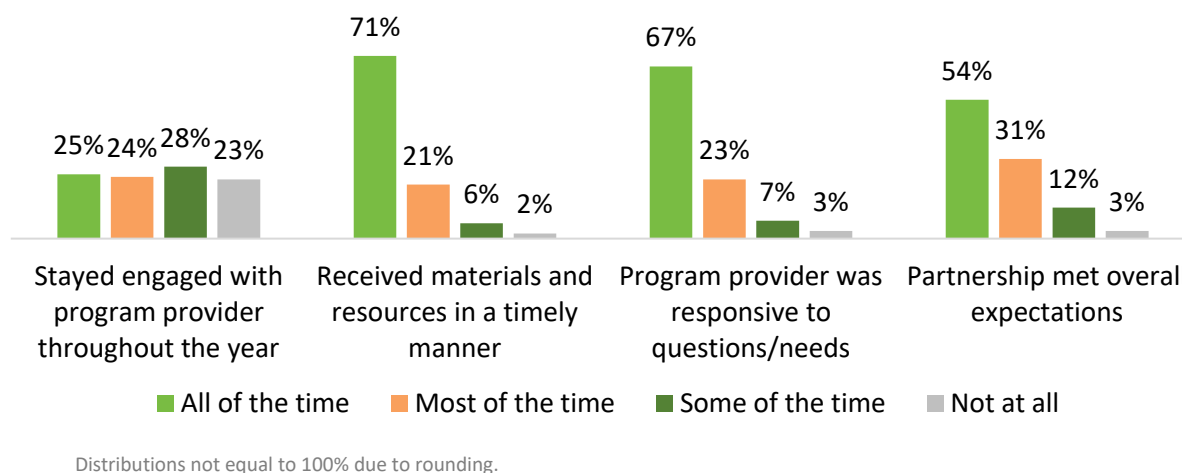


Figure 2. Educator experiences with program providers

A little less than half of responding educators (41%) did not report any challenges in working with their program providers, and over one-third (34%) did not contact their program provider. Fewer than 10% of respondents reported challenges or barriers in working with their program providers (responses not mutually exclusive). This included approximately nine percent (n=81) of respondents who indicated that the training did not adequately prepare them to implement the program, and five percent (n=48) who reported they did not know their program provider. Approximately three percent reported that the program's website was difficult to navigate (n=26) or that responses to communication attempts were

not made in a timely manner (n=28). Around one percent of respondents reported challenges with software or equipment malfunctions (n=12) or reimbursements (n=10). Other challenges described reflected pandemic-related reasons (e.g. other curriculum prioritized, virtual teaching, classroom restrictions for shared materials), insufficient training or virtual PD not conducive to learning how to implement, and misunderstandings in how many kits they were eligible to order.

Over two-thirds (67%) of respondents were able to implement their programs in full or in part, and 28% did not encounter any challenges or barriers to implementation. Aside from challenges or barriers due to pandemic-related reasons (12%, n=107), the most common challenges or barriers reported by respondents were related to time, with 11% (n=98) indicating that it took more time than they expected to plan, prepare, or set up the lessons and activities, and 12% (n=108) responding that they did not have enough time to implement the entire programs for reasons unrelated to the pandemic. The next most common challenges or barriers reported by respondents were that they did not have enough materials for their students (8%, n=71), and not being familiar enough with the program or knowledgeable about the topics to teach it properly (7%, n=58). Other miscellaneous challenges (8%, n=67) described difficulty finding time to both prep and teach the material, difficulties with the quality of materials in the kits, and lack of communication about competition opportunities. Additionally, a few mentioned staffing and support shortages as well as not having enough materials for each individual student.

[Outcomes and Impacts of the 2020-2021 Scale-Up Programs](#)      Respondents reported that they gained skills and confidence in teaching STEM topics due to their participation in STEM Scale-Up programs. The majority of educators agreed or strongly agreed that the program increased their knowledge of STEM topics (94%), gave them more confidence to teach STEM topics (93%), helped them learn effective methods for teaching in STEM-content areas (92%), and that they now are better prepared to answer students' STEM-related questions (90%).

As for program sustainability, nearly all responding educators (94%) reported that they will be using the program with their students again next year in whole or in part. While another 5% (n=35) reported they did not know if they will use the program again, and 1% (n=7) did not plan to use the program again

Educators observed that their students benefitted from their participation in the STEM Scale-Up programs (Figure 3). From a list of potential student outcomes, 73% of the educators reported observing increased student interest in STEM topics, and 57% reported increased student awareness in STEM topics. Approximately 37% of educators observed increased student achievement in STEM topics, 23% reported increased student awareness in STEM career opportunities, and 19% observed increased student interest in STEM career opportunities. Additionally, 11% reported increased interest in post-secondary STEM opportunities. Seven percent of educators (7%) also noted other observable student outcomes including increases in students' engagement, confidence, excitement about STEM, and understanding of STEM-related concepts.

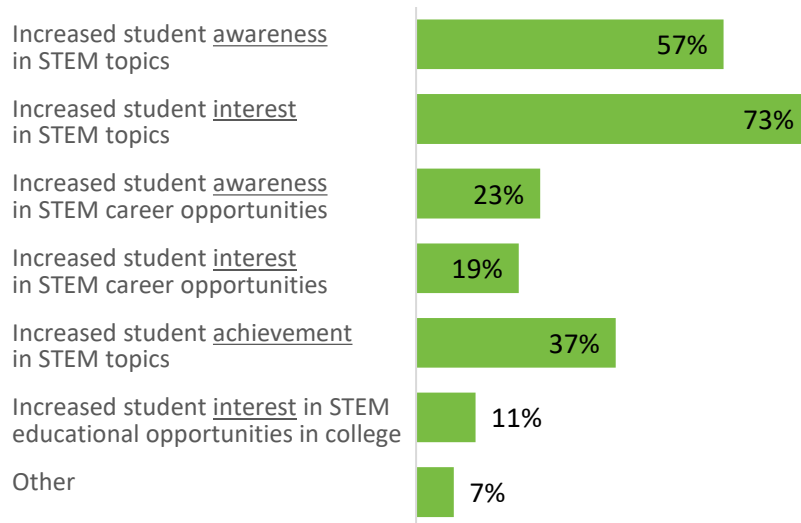


Figure 3. Observed student outcomes of the STEM Scale-Up Program

In an open-ended question, educators were asked in what ways, if any, the program(s) had an impact on their curriculum or instruction with students; 424 educators provided a response. These comments were grouped by themes into four overarching categories, each with its own subcategories of responses.

Comments related primarily to:

1. *STEM Education*, which included: interest and excitement in STEM, STEM exposure, and scientific thinking.
2. *Student Learning and Engagement*, which included: hands-on learning, student creativity, student engagement and motivation, and individualized student learning.
3. *Curriculum and Instruction Impact*, which included: new ideas/materials, supplement to existing curriculum, and pedagogical enrichment.
4. *Additional Issues, which included: problems educators encountered.*

Exemplar quotations for each theme and subcategory related to the impact of the STEM Scale-Up programs are provided below. Many comments related to more than one theme – in this case, a predominant theme was identified and the quote was categorized accordingly. Quotes have minor edits for spelling and clarity.

#### 1. STEM Education

##### *Interest and Excitement in STEM*

- *Bringing robotics into the classroom was a hit with the students. Overall, students were interested, excited, and engaged, if not from the outset then also eventually from those reluctant with the topic/materials. I will absolutely continue with robotics in the classroom as a way to engage students with STEM practices and topics.*

- *It brought the learning alive for the students. They made greater connections, and the learning continued beyond the classroom. There is a hunger from the students to learn more and experience more that involves STEM-related topics.*

#### *STEM Exposure*

- *Helped me better understand necessary skills for STEM jobs and how to better prepare students for STEM fields.*
- *I had many students who had not been exposed to computer science before and this gave them their first glance/exposure to a whole new area of curriculum and academics that they have never had. I had many students who started the course not really knowing what they were getting into, and many ended the course knowing they either loved it or didn't love it.*
- *I love this program! It has greatly improved my science curriculum and giving students the opportunity to be exposed to different science themes.*

#### *Scientific Thinking*

- *Gave them more STEM related vocabulary words about the topic we were doing as a project. More experiments and exploring which is exciting to the children.*
- *Implementing the Scale-Up program enhanced the students' skills in areas such as observation, knowledge of the scientific method, problem solving, and the engineering design process. There was an observable increase in student interest in STEM fields following implementation of the program.*

## *2. Student Learning and Engagement*

#### *Hands-on learning*

- *All my kids really took to this but my middle school kids especially got really involved with the Vex materials. They built the robot they were supposed to then tore it down and rebuilt it in really creative ways. This worked out far greater than I had anticipated. We will definitely use these kits in the future.*
- *I am really proud of myself this year (sorry to brag) I have imbedded many of the STEM activities into our creative curriculum units of study. I have opened all my kits and know what I can do with all of them. We have ton root view kit, gotten the merge cube with ipad into student hands, Used the insect viewing kit. Had the kids make grabbers. Used the sail cars-kids constructed them and we experimented with them and the fan. I feel my students have had a whole new world of vocabulary and ideas opened to them and I am going to do ever more next year. [Name redacted] always answers emails quickly and I appreciate that.*

#### *Student Creativity*

- *I know parents and students were impressed with the kind of thinking and activities their kindergarten student was doing. The hands on exploration was so much fun and it kept my kids engaged. We were able to attach the activities to K standards and it helped us to better serve our students.*

- *I like how the Computer Science Principles class through Code.org scaffolds the learning. They investigate, guided practice then make it on their own.*

#### *Student Engagement and Motivation*

- *It helped us look at breaking down problems into the steps and made us look at problems like puzzles instead of road blocks.*

#### *Individualized Student Learning*

- *Great resource for intervention/struggling students*
- *Most of my students are self-motivated, with this program they were able to take charge of their own learning and make their own goals.*

### *3. Curriculum and Instruction Impact*

#### *New Ideas/Materials*

- *Before this, computer science was something we weren't really able to approach in programming as our staff does not have much background in it or a way to translate it to a fun program for kids to learn about it. The CSF provided us building blocks to progress towards better computer science programming.*
- *It's such a joy to have the materials. I could never have purchased or assembled such a great collection of materials.*
- *Provided some alternative ways for students to interact with math content rather than the traditional whole group lesson delivery with whole/small/independent practice. It's always great when kids can use actual manipulatives, especially in this last year when everything has been so screen and technology oriented.*

#### *Supplement to Existing Curriculum*

- *Great to implement during science/technology/social skills time in day and also could tie in to other themes during specific months.*
- *I felt that the STEM Scale-Up program constantly is giving me greater tools for my toolbox. The students were able to see another side of STEM that they would not have been able to see otherwise.*

#### *Pedagogical Enrichment*

- *It helped us learn ways to support STEM learning in our programming. It also taught us that it's okay to just let them explore these tools and objects, and learn through inquiry over strict/lesson plan/fact based teaching.*
- *Gave me more materials, and the confidence to give it a try.*
- *So easy to grab an off the shelf curriculum. I am not an Engineer, but the programs we selected are engineering programs. I am more confident delivering engineering programs now.*



#### 4. Additional Issues

##### *Problems Teachers Encountered*

- *I used some of the materials but because of COVID I couldn't put them all out. The other barrier was that I didn't really know what to do with a lot of it. I think in-person exploration and teaching would have solved a lot of this. I needed more hands on time with these materials while with my instructor and with other preschool teachers.*
- *It took a lot of time and planning to prepare the activities.*
- *It took more time to plan, and when we went virtual, I did not use it.*

## STEM Scale-Up Program Student Participants

**Data Source** Student Participant Lists, Iowa STEM Monitoring Project  
 Provided by Iowa Testing Programs, University of Iowa

In 2020-2021, there were 17,124 unique students listed on student participant lists submitted to Iowa Testing Programs, of which 7,991 were matched to Iowa Statewide Assessment of Student Progress (ISASP) student records. The remaining 9,133 were in either early elementary (PreK-2) or 12<sup>th</sup> grades which are grades levels prior to or beyond which the ISASP is typically administered, respectively. Among those matched to their student records, 48% were females and 52% males (Table 3). The distribution of students by race/ethnicity was 77% White, 15% Hispanic, 3% Black/African American, and 6% other races combined (Table 4).

Table 3. Distribution by gender of STEM Scale-Up Program student participants

	Female	Male		Female	Male
<i>Total</i> <sup>1</sup>			<i>STEM Region</i>		
All	48%	52%	Northwest	48%	52%
			North Central	48%	52%
			Northeast	49%	51%
			Southwest	45%	55%
			South Central	49%	51%
			Southeast	48%	52%
<i>Grade</i> <sup>2</sup>	Female	Male	<i>STEM Scale-Up Program</i> <sup>3</sup>	Female	Male
PK	45%	55%	Bootstrap: Data Science	40%	60%
K	47%	53%	Computer Science Discoveries	50%	50%
1	46%	54%	Computer Science Fundamentals	50%	50%
2	48%	52%	Computer Science Principles	17%	83%
3	49%	51%	CASE: Food Science and Safety	*	*
4	50%	50%	Desmos Middle School Math	49%	51%
5	47%	53%	Differentiated Math Centers	48%	52%
6	49%	51%	Pint Size Science	50%	50%
7	49%	51%	PLTW: Cybersecurity	36%	64%
8	48%	52%	STEM in Action	48%	52%
9	37%	63%	STEM Innovator	51%	49%
10	48%	52%	VEX IQ Challenge	45%	55%
11	33%	67%	VEX V5	46%	54%
12	22%	78%			

\*Gender distribution not reported for counts of less than 30 students.

1. Gender distributions overall and by region and program subgroup based on matched student records for grades 3-11 (n=7,991).

2. Gender distributions by grade based on self-report for grades PreK-2/12 (n=9,133) or on matched ISASP student records for grades 3-11 (n=7,991).

3. CASE: Food Science and Safety was awarded in 2019-2020 and implemented in 2020-2021.

Table 4. Distribution by race/ethnicity of STEM Scale-Up Program participants

	White	Hispanic	Black	Asian	All other races combined
All <sup>1</sup>	77%	15%	3%	2%	4%
<i>STEM Region</i>					
Northwest	85%	10%	1%	1%	4%
North Central	57%	31%	3%	4%	4%
Northeast	74%	17%	4%	1%	4%
Southwest	87%	6%	2%	0%	4%
South Central	85%	6%	2%	3%	4%
Southeast	86%	7%	3%	1%	3%
<i>STEM Scale-Up Program<sup>2</sup></i>					
Bootstrap: Data Science	93%	3%	1%	1%	2%
Computer Science Discoveries	89%	5%	2%	2%	3%
Computer Science Fundamentals	89%	6%	2%	0%	3%
Computer Science Principles	89%	3%	0%	5%	3%
CASE: Food Science and Safety	*	*	*	*	*
Desmos Middle School Math	88%	8%	1%	0%	3%
Differentiated Math Centers	56%	33%	3%	4%	4%
Pint Size Science	77%	8%	8%	0%	8%
PLTW: Cybersecurity	89%	5%	1%	2%	4%
STEM in Action	80%	11%	5%	0%	4%
STEM Innovator	85%	4%	4%	1%	5%
VEX IQ Challenge	81%	12%	3%	1%	4%
VEX V5	85%	7%	2%	3%	4%

\*Gender distribution not reported for counts of less than 30 students.

1. Distributions by race-ethnicity based on matched student records for grades 3-11 (n=7,991).

2. CASE: Food Science and Safety was awarded in 2019-2020 and implemented in 2020-2021.

## Key findings

Statewide standardized assessments are taken annually by nearly every student in 3<sup>rd</sup> through 11<sup>th</sup> grade in the State of Iowa. The Iowa Assessments were administered from FY13 through FY18, and the Iowa Statewide Assessment of Student Progress were administered beginning in FY19. Since 2012-2013, an Interest Inventory has been added to the standardized assessments to measure student interest in individual subject areas, STEM careers, and living and working in Iowa after graduation (Appendix A).

### STEM Interest among Scale-Up students versus students statewide

The proportion of Scale-Up participants expressing interest in STEM subjects and careers was compared to the proportion of students statewide that expressed interest.

- In 2020-2021, a higher percentage of students who participated in STEM Scale-Up programs said *I like it a lot* (Grades 3-5) or were *Very interested* (Grades 6-11) in STEM subjects, in pursuing a STEM career, and in working in Iowa after graduation compared to all students statewide (Figure 4).
- The percent of students who said they were *very interested* in having a STEM job was 34% of Scale-Up program participants compared to 33% of students statewide.
- The percent of students who said they were *very interested* in working in Iowa was 43% of Scale-Up program participants compared to 35% of students statewide.

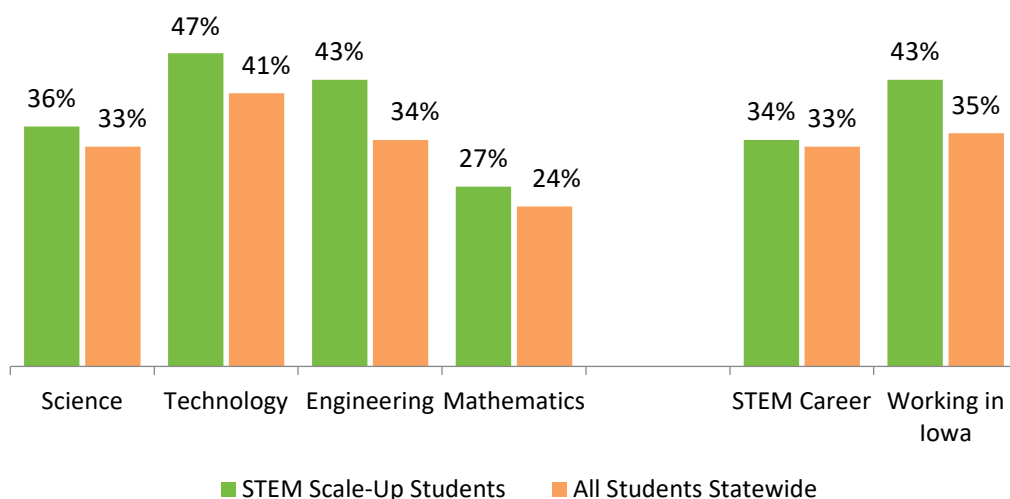


Figure 4. STEM Interest among Scale-Up students in Grades 3 through 11 versus students statewide, 2020/21

- For students in Grades 3-5 and Grades 6-8, interest in STEM topics and STEM careers between Scale-Up participants and students statewide is very similar (Figure 5 and Figure 6, respectively).
- For Grades 9-12, students participating in Scale-Up programs showed more interest in STEM topics and STEM careers than students statewide (Figure 7).

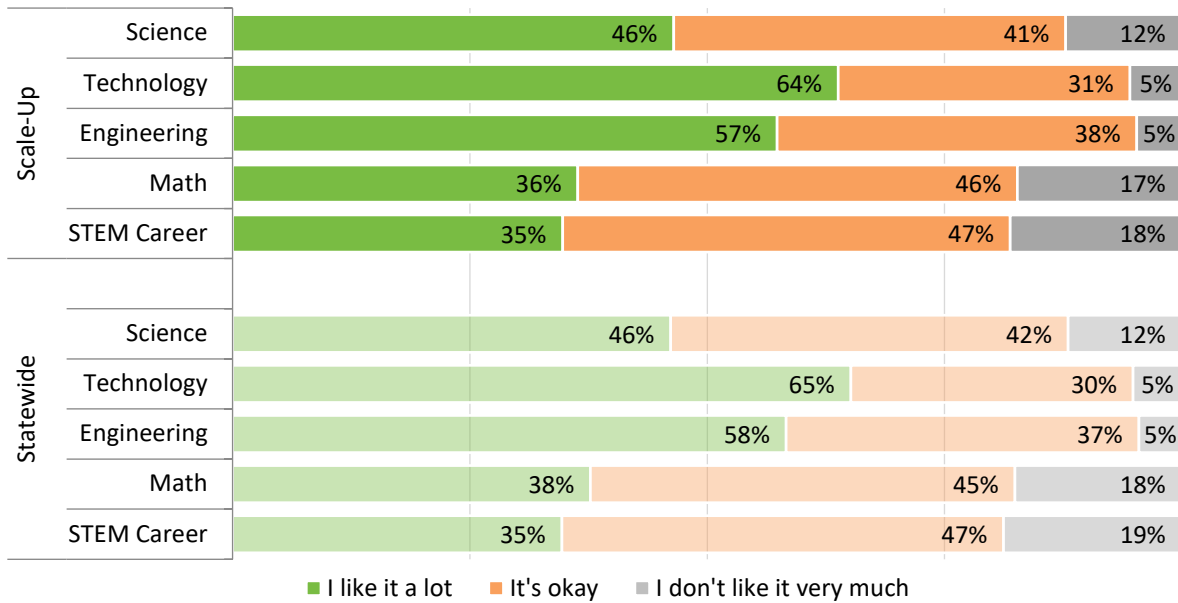


Figure 5. Interest in STEM topics and careers for Grades 3-5 Scale-Up students and students statewide, 2020/21

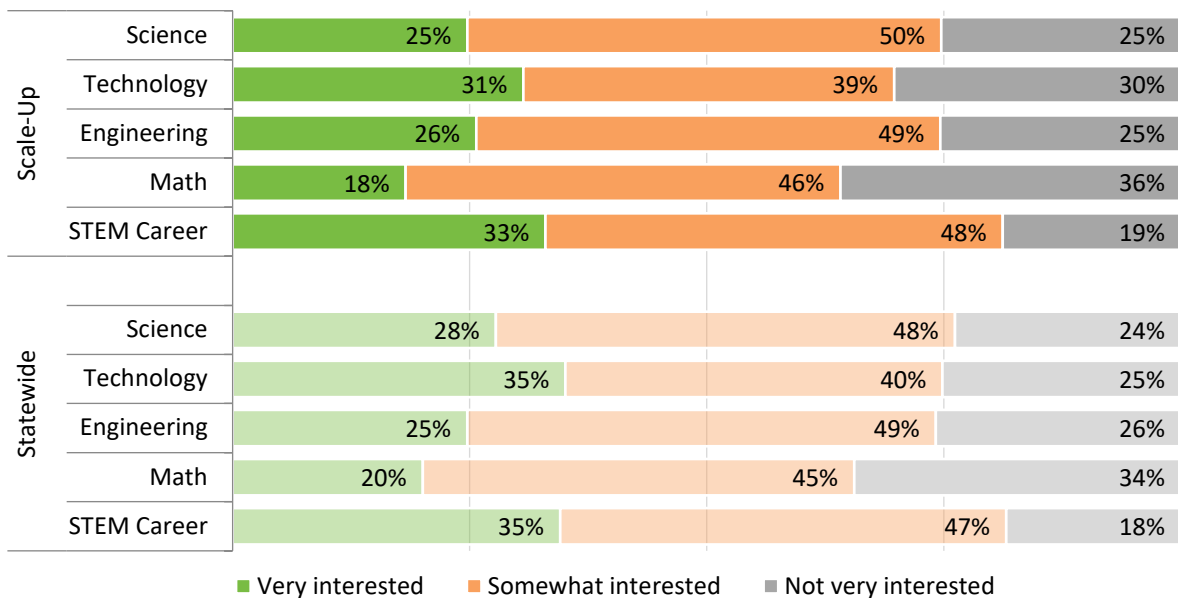


Figure 6. Interest in STEM topics and careers for Grades 6-8 Scale-Up students and students statewide, 2020/21

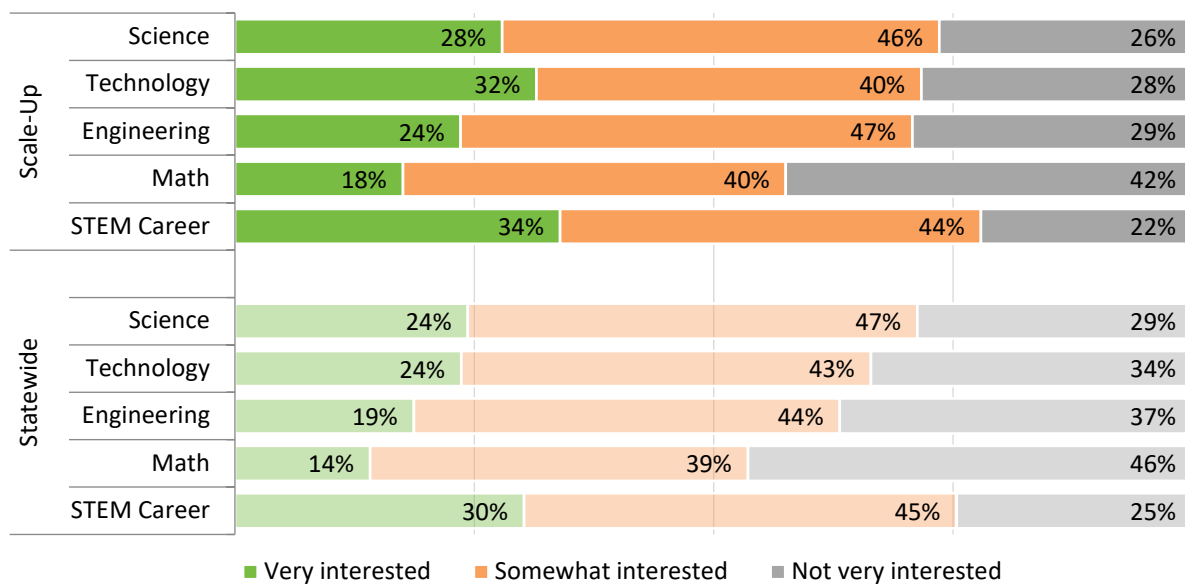


Figure 7. Interest in STEM topics and careers for Grades 9-11 Scale-Up students and students statewide, 2020/21

#### Achievement in mathematics, science, and English language arts on the Iowa Statewide Assessment of Student Progress (ISASP), Scale-Up students versus statewide comparison

In 2018-2019, the state of Iowa implemented new standardized assessments, the Iowa Statewide Assessment of Student Progress (ISASP). This is a substantial change in the evaluation methods compared to 2017-2018 and years' prior when Iowa Assessments were used to compare Scale-Up student achievement. ISASP assessments in *mathematics* and *English language arts* are given annually to students in 3<sup>rd</sup> through 11<sup>th</sup> grade; while the *science* assessment is only administered to students in 5<sup>th</sup>, 8<sup>th</sup>, and 10<sup>th</sup> grade. Students who participated in a STEM Scale-Up program were compared to students statewide with regard to achievement in *mathematics*, *science*, and *English language arts*. The *English language arts* component is a modification to the reading comparisons used in previous years. ISASP scores in these subjects were compared using percentage of students performing at Proficient level or above. This is different metric from comparisons of National Percentile Rank on the Iowa Assessments used in previous reports, and does not allow for comparisons of trends over time with evaluation results from 2017-2018 and years prior. In addition, comparisons reflect association between Scale-Up Programs and achievement, not causation.



- In 2020-2021, STEM Scale-Up Program participants performed better on the Iowa Statewide Assessment of Student Progress (ISASP) in *mathematics* (+3 percentage points) and *science* (+1 percentage point) compared to all students statewide. (Figure 8).
- Results varied by grade level, in some grades a greater proportion of STEM Scale-Up Program participants performed at the Proficient or Advanced level *mathematics* (Figure 9), *science* (Figure 10), and *English language arts* (Figure 11) on the ISASP compared to all students statewide.

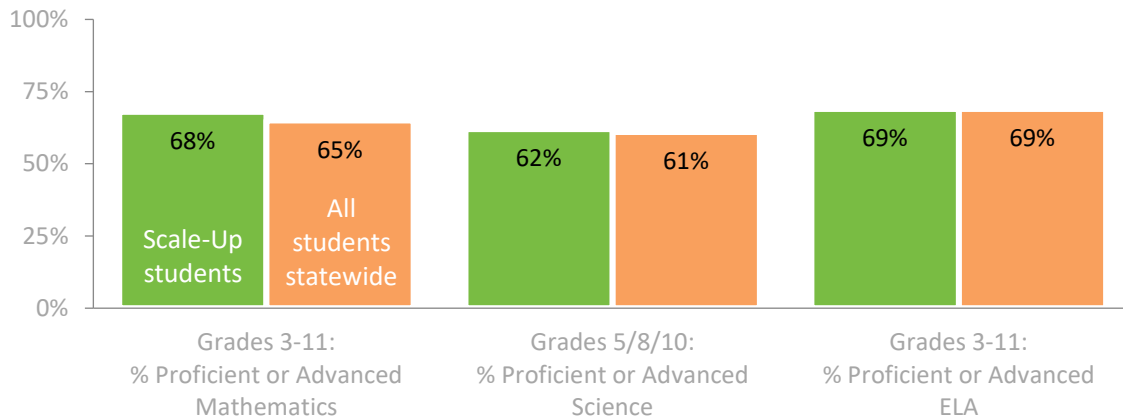


Figure 8. Percent meeting benchmarks at or above Proficient level, Scale-Up students v. all students statewide, 2020/21

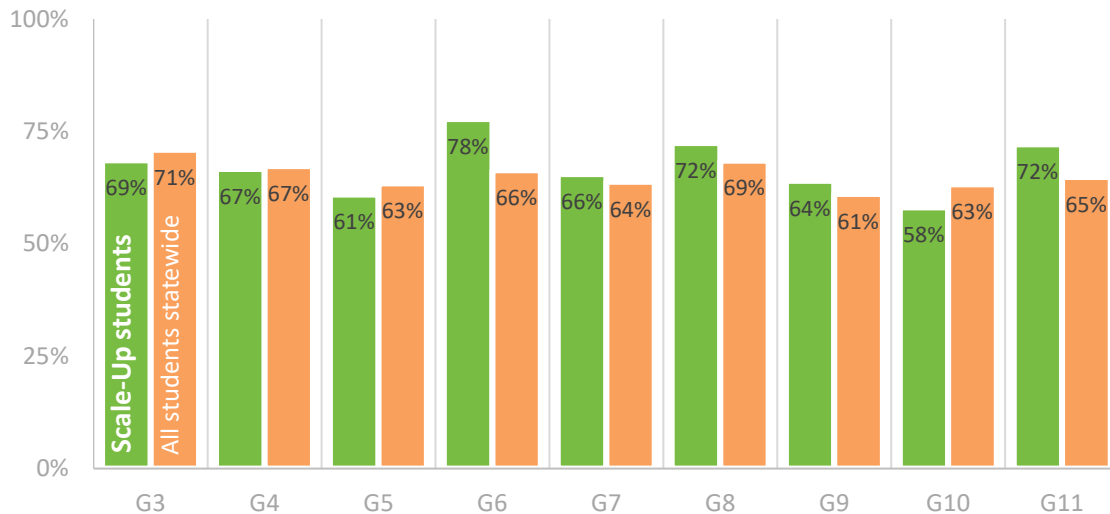


Figure 9. Percent meeting benchmarks at or above Proficient in *Mathematics* by grade level, Scale-Up students v. all students statewide, 2020/21

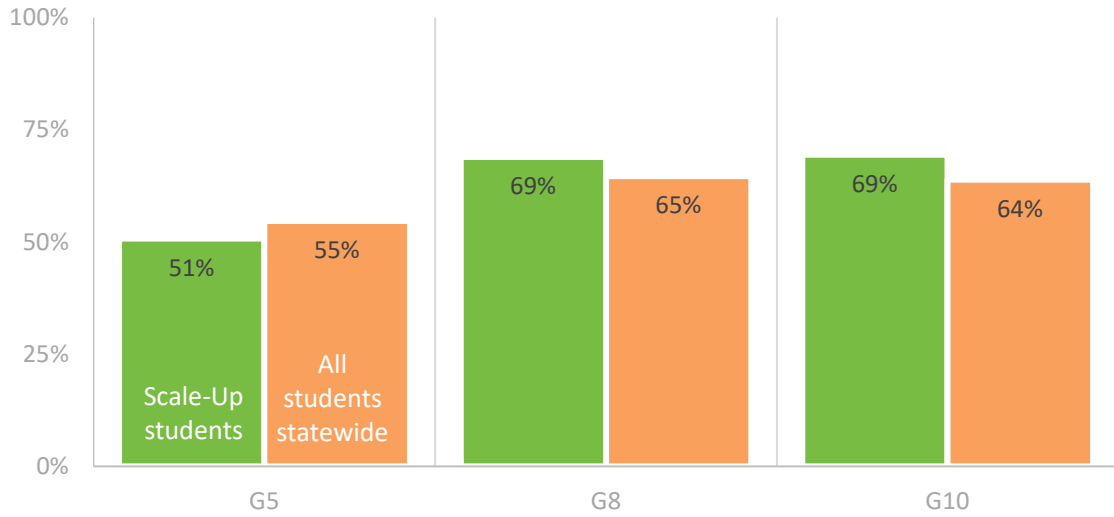


Figure 10. Percent meeting benchmarks at or above Proficient in *Science* in Grades 5/8/10, Scale-Up students v. all students statewide, 2020/21

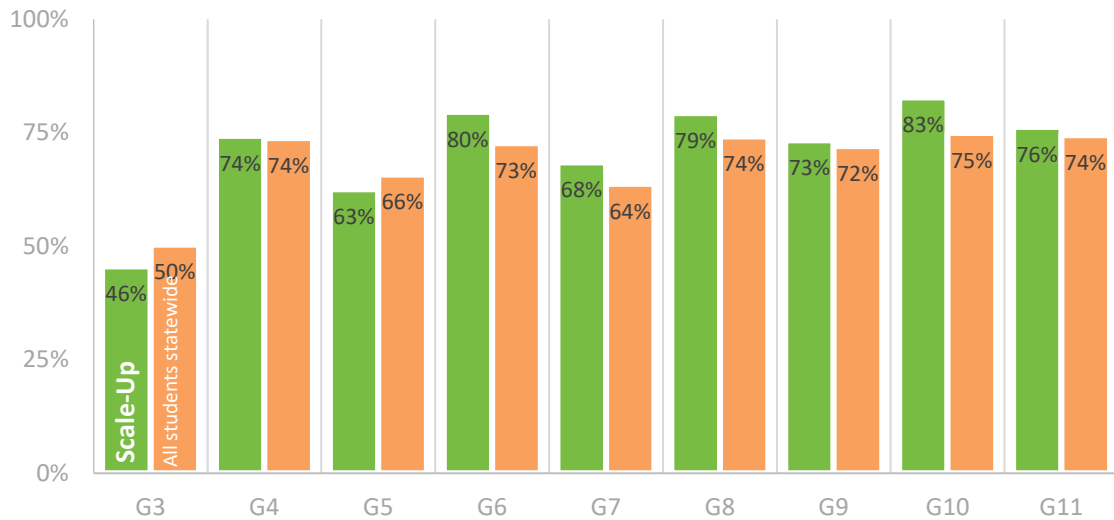


Figure 11. Percent meeting benchmarks at or above Proficient in *English language arts* by grade level, Scale-Up students v. all students statewide, 2020/21

- For minority students, 2% more STEM Scale-Up Program participants met Proficient or Advanced level benchmarks in *science* compared to minority students who did not participate; however, this trend was not observed in *mathematics* or *English language arts* achievement this year (Figure 12). (Minority students are aggregated scores of all non-white STEM Scale-Up students due to small sample sizes in subgroup analysis).

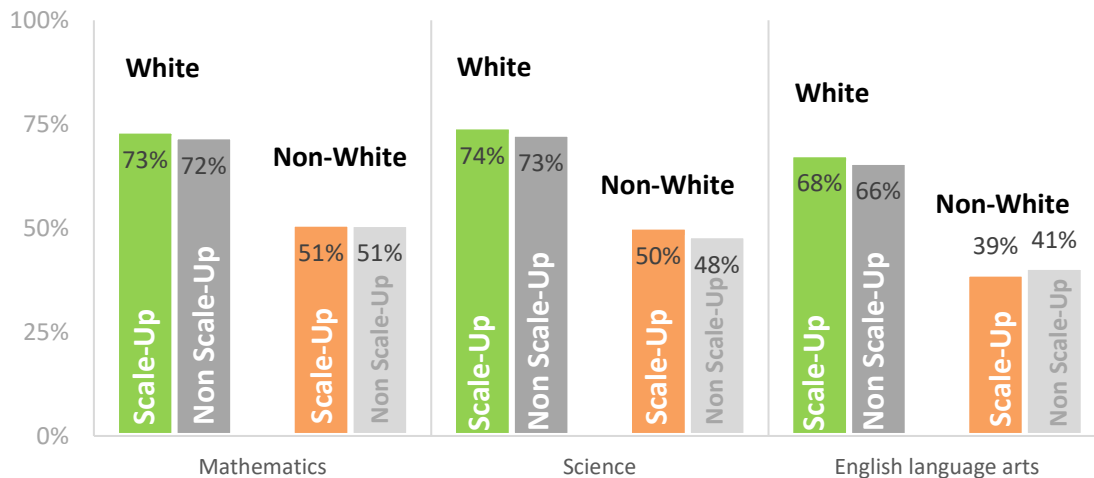


Figure 12. Percent of students performing at Proficient level or above, White versus non-White students in Grades 3 through 8 by STEM Scale-Up program participation, 2020/21

## Section 2. Iowa STEM Indicators

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Iowa STEM indicators track publicly available data at the national and state level. The purpose of the indicators is to provide annual benchmarks on a variety of STEM topics in education and economic development by systematically assessing the progress and condition of the state's STEM landscape. The indicators fulfill the need for benchmarks related to a variety of domains in the area of STEM education and workforce development.

Iowa's STEM indicators are organized across four primary areas of focus: 1) STEM achievement and interest among preK-12 students, 2) STEM preparation of preK-12 students, 3) STEM college completions, and 4) STEM employment (Table 5). All indicators are reviewed each year for data quality and utility in providing useful benchmarks to the Council. In addition, new or updated indicators are explored as other data and data sources are identified or in response to targeted activities or policy interests by the Council (Table 5).

When possible, the indicators are compared across demographic, geographic, and other characteristics of respondents. Data used to track Iowa's STEM indicators are publicly available and come from sources such as the Iowa Department of Education, the National Center for Education Statistics (NCES), Iowa Workforce Development (IWD), ACT, and Iowa Testing Programs. Each data source has its own dissemination schedule in the timing of data collection, analysis, and reporting, which does not always overlap with the timeline of this report. This variability limits the ability to report on all indicators at the same time annually.

Table 5. Indicators tracked for 2020-2021

Indicator	Data source	2016 /17	2017 /18	2018 /19	2019 /20	2020 /21
<b>STEM achievement and interest among preK-12 students</b>		✓	✓	✓	✓	✓
Iowa student achievement in mathematics and science	Iowa Testing Programs	✓	✓	✓	✓	✓
Iowa student achievement on NAEP mathematics and science tests <sup>1</sup>	National Center for Education Statistics	✓	✓	✓	✓	✓
Number/Percentage of preK-12 students interested in STEM topic areas	Iowa Testing Programs	✓	✓	✓	✓	✓
Number of students taking the ACT and average scores in mathematics/science	ACT	✓	✓	✓	✓	✓
Interest in STEM among ACT test-takers	ACT	✓	✓	✓		
Top 5 majors among ACT test-takers with interest in STEM	ACT	✓	✓	✓		
<b>STEM preparation of preK-12 students</b>						
Enrollment in STEM courses in high school	Iowa Department of Education	✓	✓	✓	✓	✓
Number of students taking STEM Advanced Placement tests and average scores	College Board	✓	✓	✓	✓	✓
Concurrent and dual enrollment in STEM courses	Iowa Department of Education	✓	✓	✓	✓	✓
Number of current Iowa teachers with K-8 STEM endorsements, 5-8 STEM endorsements, and K-12 STEM specialist endorsements <sup>2</sup>	Iowa Department of Education	✓	✓	✓	✓	✓
<b>Post-secondary enrollment and training in STEM fields</b>		✓	✓	✓	✓	✓
Community college enrollment and degrees/awards in STEM fields	Iowa Department of Education	✓	✓	✓	✓	✓
College and university enrollment and degrees awarded in STEM fields	Integrated Postsecondary Education Data System	✓	✓	✓	✓	✓
<b>STEM employment</b>						
Percent of Iowans in workforce employed in STEM occupations	Iowa Workforce Development	✓	✓	✓	✓	✓
Job vacancy rates in STEM occupational areas	Iowa Workforce Development	✓	✓	✓	✓	✓

## Indicator 1: Iowa student achievement in mathematics and science

**Data source** Iowa Testing Programs, The University of Iowa

This indicator tracks the proportion of Iowa students statewide who are proficient or above in mathematics and science. In 2018-2019, Iowa Testing Programs administered a new state assessment, the Iowa Statewide Assessment of Student Progress (ISASP) which replaced the Iowa Assessments. Caution should be used in comparing performance on the ISASP to prior years when the Iowa Assessments were administered. The ISASP was not administered in 2019-2020 due to the coronavirus (COVID-19) pandemic. This indicator shows the first year of data from 2018-2019 compared to 2020-2021.

### Key findings

- In **mathematics achievement**, the percentage of students in grades 4<sup>th</sup>, 8<sup>th</sup>, and 11<sup>th</sup> who were at or above proficiency **decreased** from 2018-2019 to 2020-2021. In 2020-2021, 66% of students in 4<sup>th</sup> grade, 68% of students in 8<sup>th</sup> grade, and 64% of students in 11<sup>th</sup> grade were proficient or above compared to 72%, 72%, and 67% in 2018-2019, respectively. (Table 6).
- In **science achievement**, the percentage of students in grades 5<sup>th</sup>, 8<sup>th</sup>, and 10<sup>th</sup> who were at or above proficiency **increased** from 2018-2019 to 2020-2021. In 2020-2021, 54% of students in 5<sup>th</sup> grade, 64% of students in 8<sup>th</sup> grade, and 63% of students in 10<sup>th</sup> grade were proficient or above compared to 51%, 58%, and 62%, respectively.
- By gender, a **higher proportion of female students were proficient or above in both mathematics and science compared to male students in the secondary grade levels** but were lower in the elementary grade level.
- Across years, the proportion at or above proficient in mathematics decreased for both males and females from 2018-2019 to 2020-2021. In science, the proportion at or above proficient increased among males from 2018-2019 to 2021-2021. Among females, science achievement decreased across years for 5<sup>th</sup> grade, increased for 8<sup>th</sup> grade, and remained the same for 10<sup>th</sup> grade.
- Overall, there are disparities in proficiency across subgroups. The proportions of minority students, those of low socioeconomic status, and students with disabilities who demonstrate proficiency are consistently lower than the overall rates. Across years, the percentage meeting proficiency generally decreased for mathematics but increased for science across most subgroups.



Table 6. Proportion of Iowa students statewide who are proficient or above in mathematics and science

		2018-2019			2020-2021			Trend 2018/19 to 2020/21		
		4th	8th	11th	4th	8th	11th	4th	8th	11th
Mathematics	Overall	72%	72%	67%	66%	68%	64%	↓	↓	↓
	Male	74%	69%	65%	69%	66%	62%	↓	↓	↓
	Female	71%	74%	69%	64%	70%	67%	↓	↓	↓
	White	78%	77%	72%	73%	73%	69%	↓	↓	↓
	Black / African American	39%	40%	30%	34%	34%	31%	↓	↓	↑
	Hispanic	57%	55%	46%	49%	53%	46%	↓	↓	↔
	Low income	58%	56%	47%	50%	52%	45%	↓	↓	↓
	Disability	35%	25%	14%	30%	24%	13%	↓	↓	↓
		5th	8th	10th	5th	8th	10th	5th	8th	10th
Science	Overall	51%	58%	62%	54%	64%	63%	↑	↑	↑
	Male	50%	57%	58%	55%	63%	60%	↑	↑	↑
	Female	53%	59%	67%	52%	65%	67%	↓	↑	↔
	White	57%	64%	68%	60%	70%	68%	↑	↑	↔
	Black / African American	21%	27%	28%	22%	29%	31%	↑	↑	↑
	Hispanic	35%	39%	43%	34%	46%	45%	↓	↑	↑
	Low income	36%	42%	46%	37%	48%	48%	↑	↑	↑
	Disability	20%	18%	17%	21%	23%	19%	↑	↑	↑

Source: Iowa Statewide Assessment of Student Progress, Iowa Testing Programs, The University of Iowa

Retrieved from *The Annual Condition of Education*, Iowa Department of Education, 2021

<https://educateiowa.gov/data-and-reporting/education-statistics/annual-condition-education-report-pk-12>

1. In 2018-19, Iowa Testing Programs administered a new state assessment, the Iowa Statewide Assessment of Student Progress (ISASP). Caution should be made in comparing performance on the ISASP to years prior to 2018-2019.
2. Proficiency cut scores for the ISASP are presented in a Standard Score metric and are specific to grade and content. These cut scores categorize student performance into one of three levels: Advanced, Proficient and Not Yet Proficient.
3. The 2019-2020, the ISASP was not administrated due to the coronavirus (COVID-19) pandemic.

## Indicator 2: Iowa student achievement on NAEP mathematics tests

**Data source** National Assessment of Educational Progress (NAEP), National Center for Education Statistics (NCES)

NAEP Assessments in mathematics are administered to 4<sup>th</sup> and 8<sup>th</sup> grade students in odd numbered years. NAEP Assessments in science were administered in 2009, 2011 (8<sup>th</sup> grade only), and 2015 and are reported in previous annual reports from FY13 through FY18.

There was no new data to report for 2021.

### Key findings

- Compared to 2013, mathematics scores in 2019 decreased among 4<sup>th</sup> grade students and across all demographic subgroups. The difference was statistically significant for all students ( $p < .01$ ), males ( $p = .02$ ), females ( $p < .001$ ), and Hispanic students ( $p = .03$ ) (Table 7).
- Compared to 2013, mathematics scores in 2019 decreased among 8<sup>th</sup> grade students and across most demographic subgroups (overall, males, females, or Black / African American). The difference was statistically significant for all students ( $p = .02$ ) and males ( $p = .04$ ).
- The average scale scores among 8<sup>th</sup> grade students who are Hispanic increased four points from 265 in 2013 to 269 in 2019, though the difference was not statistically significant.
- Since 2013, Iowa's national rank dropped to 25<sup>th</sup> in the nation regarding 4<sup>th</sup> grade mathematics scores (compared to 14<sup>th</sup> in 2013). For 8<sup>th</sup> grade mathematics, Iowa's national rank of 26<sup>th</sup> dropped one spot from 2013.
- Less than half (42%) of 4<sup>th</sup> graders and approximately one-third (33%) of 8<sup>th</sup> graders who took the NAEP mathematics test in 2019 scored well enough to be rated at or above proficient in mathematics.

Table 7. Iowa mathematics scores on the National Assessment of Educational Progress

Grade	Variable		2013 <sup>1</sup>		2019		Iowa's Trend since 2013
			Iowa	National	Iowa	National	
4 <sup>th</sup>	Scale score (0-500)	All students	246	242	241**	241	↓
		Males	247	242	243*	242	↓
		Females	244	241	239**	239	↓
		Black / African American	218	224	215	224	↓
		Hispanic	234	231	227*	231	↓
	National rank <sup>2</sup>		14		25		↓
	Num. jurisdictions significantly higher than IA <sup>3</sup>		4		10		↓
	Percent at or above Proficient (>249)		48%		42%		↓
	Percent at Advanced (>282)		9%		8%		↓
8 <sup>th</sup>	Scale score (0-500)	All students	285	285	282*	282	↓
		Males	286	285	282*	282	↓
		Females	284	284	282	282	↓
		Black / African American	255	263	249	260	↓
		Hispanic	265	272	269	268	↑
	National rank		25		26		↓
	Num. jurisdictions significantly higher than IA <sup>3</sup>		17		19		↓
	Percent at or above Proficient (>299)		36%		33%		↓
	Percent at Advanced (>333)		7%		7%		↔

\*Significant at  $p < .05$ , 2019 versus 2013, Iowa

\*\* Significant at  $p < .05$ , 2019 versus 2013, Iowa

Source: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), Mathematics Assessments

Retrieved from: <http://nces.ed.gov/nationsreportcard/statecomparisons/>  
<http://nces.ed.gov/nationsreportcard/naepdata/dataset.aspx>

1. NAEP Assessments in mathematics are administered to 4th and 8th grade students in odd numbered years; data for years not shown available upon request.
2. National rank is based out of 52 jurisdictions (50 states, the District of Columbia, and Department of Defense Education Activity).
3. A jurisdiction is defined as any government defined geographic area sampled in the NAEP assessment.

## Indicator 3: Number and percentage of students in Grades 3-5, Grades 6-8, and Grades 9-12 interested in STEM topics and careers

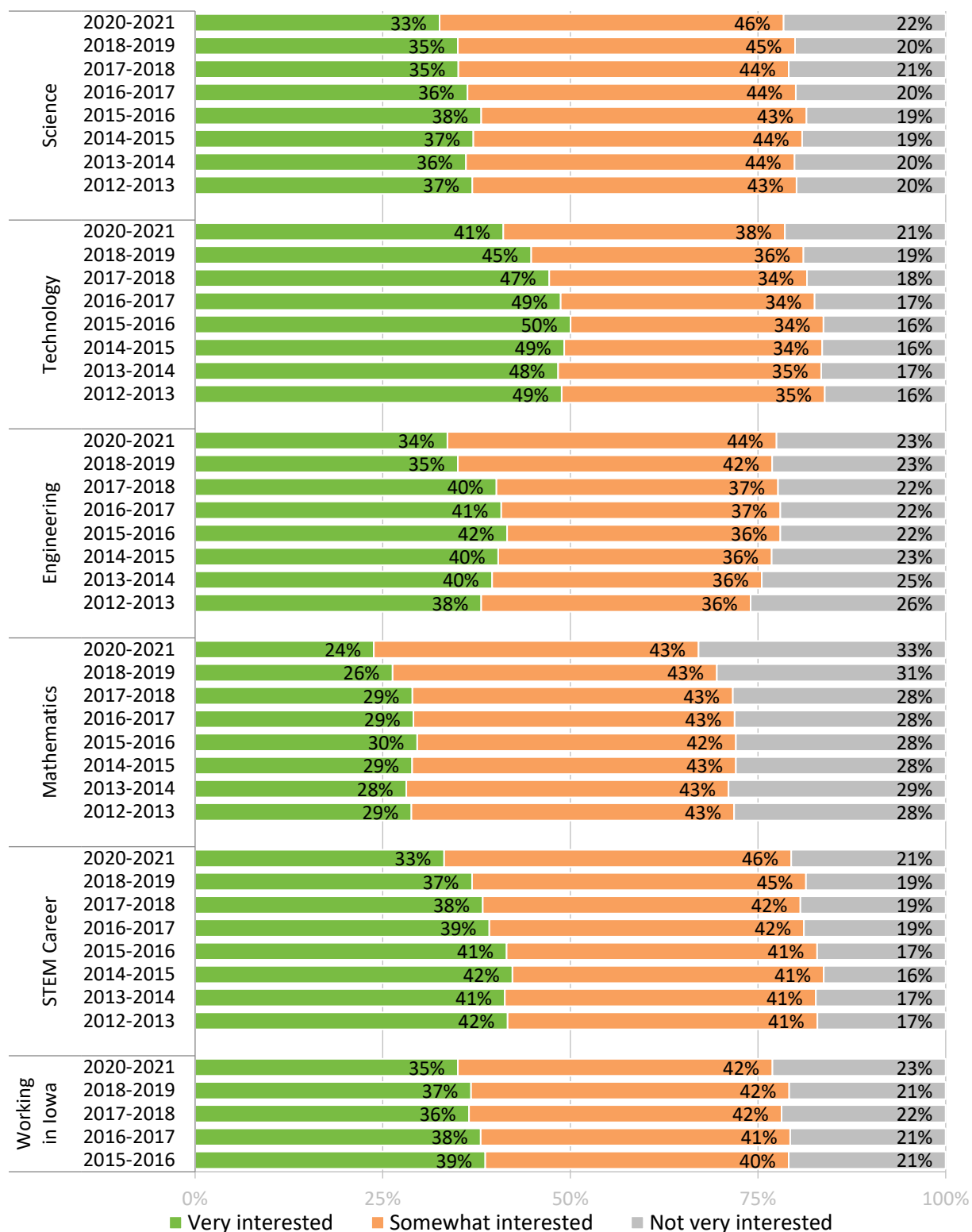
**Data source** Iowa Assessments (FY13-FY19) and Iowa Statewide Assessment of Student Progress (FY19, FY21), Iowa Testing Programs, The University of Iowa

Statewide standardized tests are taken annually by nearly every student in 3<sup>rd</sup> through 11<sup>th</sup> grade in the State of Iowa. The Iowa Assessments were administered from FY13 through FY18, and the Iowa Statewide Assessment of Student Progress were administered beginning in FY19. Since 2012-2013, an 8-item interest inventory has been added to the standardized tests. In January 2016, an additional item was added at the request of the Council. (See Appendix A for items.) Schools have the option to administer the inventory to their students. The Interest Inventory was developed in part to serve as a data source for both the Iowa STEM indicators and as a way to compare students who participate in Scale-Up Programs with all students statewide. (See Section 1 for results specific to STEM Scale-Up Program participants.)

For 2020-2021, among the 340,313 students in Iowa who took the Iowa Statewide Assessment of Student Progress, 320,855 also completed the Interest Inventory (94% participation rate).

### Key findings

- Among all students statewide, interest in individual STEM topics or in pursuing STEM careers started high in 2012-2013 and remained high through 2020-2021. Over 75% of all students statewide indicated they were “very interested” or “somewhat interested” in science, technology, engineering, or in pursuing a STEM career in 2020-2021 (Figure 13). Just less than seven in ten (67%) said they were “very interested” or “somewhat interested” in mathematics.
- In Figure 14, students who said they were “very interested” or “somewhat interested” were combined to compare changes in interest across the four STEM subjects and in STEM careers from 2012-2013 to 2020-2021 among all students statewide. Interest in the four STEM subjects is consistently highest among students in Grades 3-5, followed by students in Grades 6-8, and Grades 9-12, respectively. However, interest in pursuing a STEM career is comparable across the grade groups, ranging from 75% to 82% in 2020-2021.



Note: The ISASP was not administered in 2019-2020 due to the coronavirus (COVID-19) pandemic.

Figure 13. Statewide student interest in individual STEM topics, STEM careers, and working in Iowa, 2012/13 to 2020/21

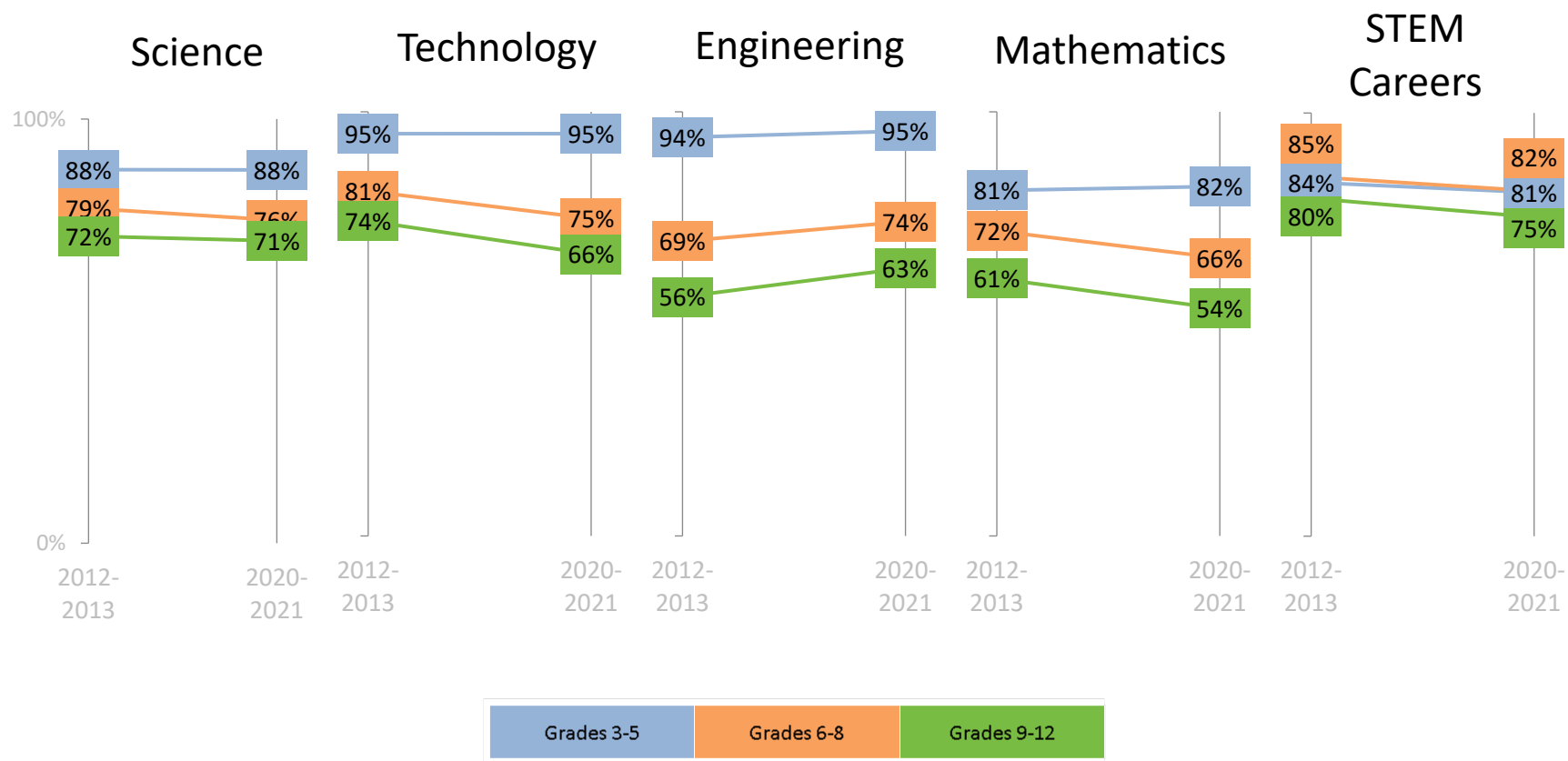


Figure 14. Proportion of all students statewide by grade group who said they were "very interested" or "somewhat interested" in STEM topics and STEM careers, 2012/13 to 2020/21



- Among all students statewide who took the Iowa Statewide Assessment of Student Progress in 2018-2019, interest in individual STEM subjects is highest among elementary students, followed by middle school and high school students, respectively (Figure 15).
- While interest in all STEM subjects decreased from elementary grades through high school, the proportion of all students statewide who are “very interested” in pursuing a STEM career remains close across grade groups, from 35% among grades 3<sup>rd</sup> through 5<sup>th</sup>, 35% among grades 6<sup>th</sup> through 8<sup>th</sup>, and 30% among grades 9<sup>th</sup> through 12<sup>th</sup>.

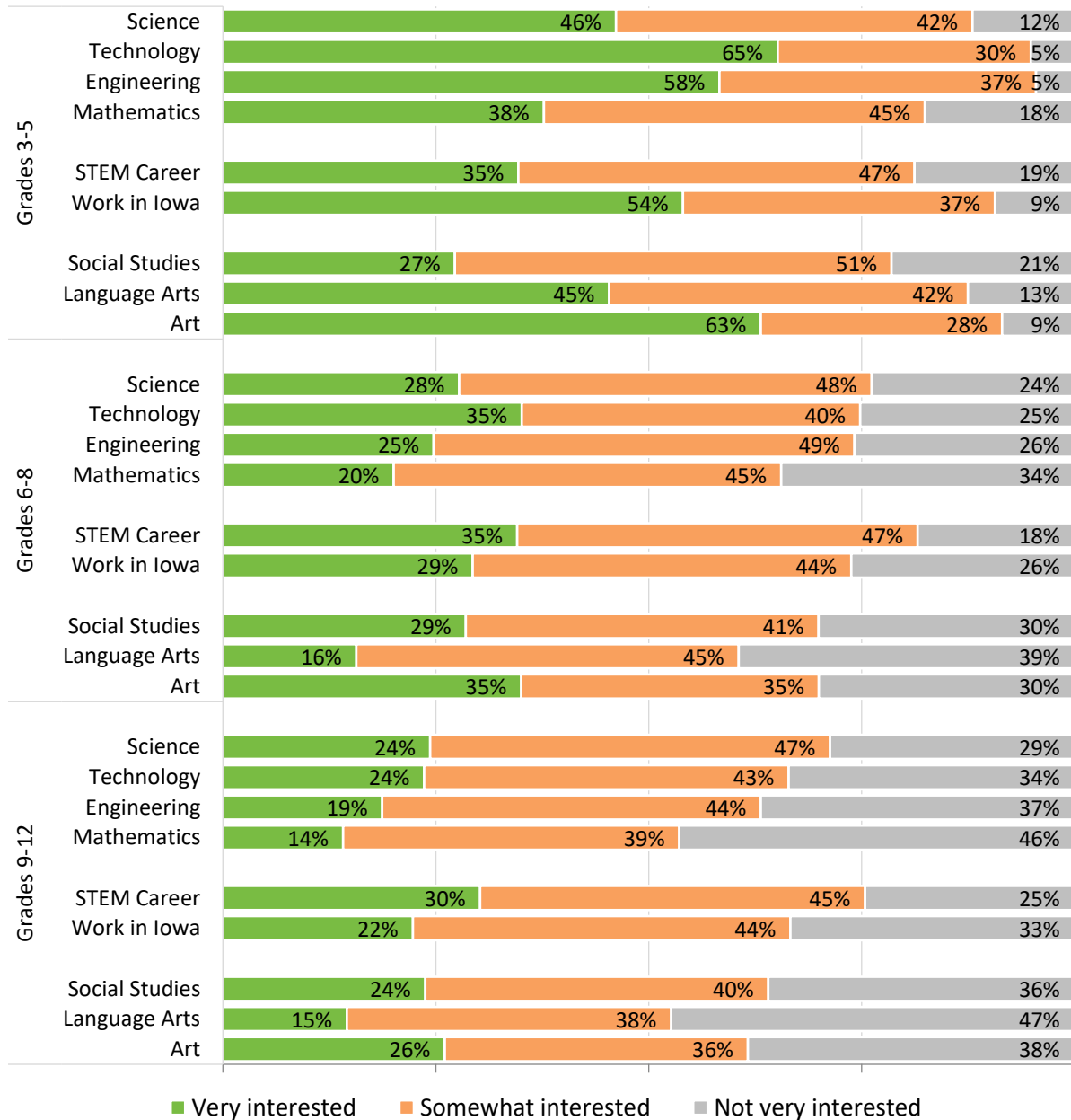


Figure 15. Statewide Student Interest Inventory for all students statewide by grade group, 2020/21 (n=302,855)

- Among all students statewide by gender, female interest in a STEM career has a steady rate of decline from an average of 29% of females in Grades 3-5 who indicated they were “very interested” in STEM, to 25% of females in Grades 6-8, and 23% of females in Grades 9-11. Male interest remains fairly stable from 40% in Grades 3-5, 44% in Grades 6-8, and 37% in Grades 9-11. The pattern follows results from 2018-2019 (Figure 16).

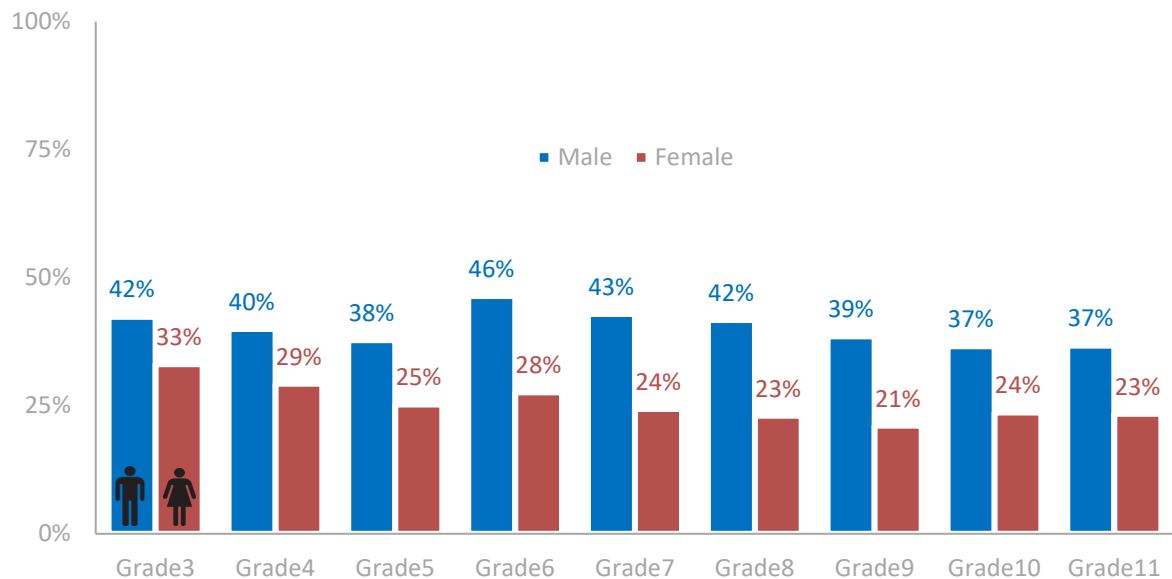


Figure 16. Percentage of male or female students statewide who said they were “very interested” in a STEM career by grade, 2020/21

- The proportion of both male and female students interested in individual STEM subject areas decline with advancing grade levels (Figure 17). There is very little difference between males and females in their interest in science and mathematics in any grade. However, the difference in interest by gender widens with advancing grades in the subject areas of computers/technology and engineering
  - The proportion of students who are “very interested” in science is similar between males and females: 52% of males and 51% of females in grade 3 compared to 25% of males and 26% of females in grade 11.
  - In computer technology, the difference in grade 5 is -13 percentage points (72% of males versus 59% of females), in grade 8 is -29 percentage points (42% of males versus 13% of females), and -26 percentage points in grade 11 (35% males versus 9% of females) between the proportions of males and females who are “very interested.”
  - In engineering, the difference in grade 5 is -8 percentage points (61% of males versus 53% of females), in grade 8 is -24 percentage points (35% of males versus 11% of females), and -21 percentage points in grade 11 (28% males versus 7% of females) between the proportions of males and females who are “very interested.”

- In mathematics, there is a similar trend of decline for both females and males: 47% of males and 39% of females are “very interested” in grade 3 compared to 15% of males and 11% of females in grade 11.

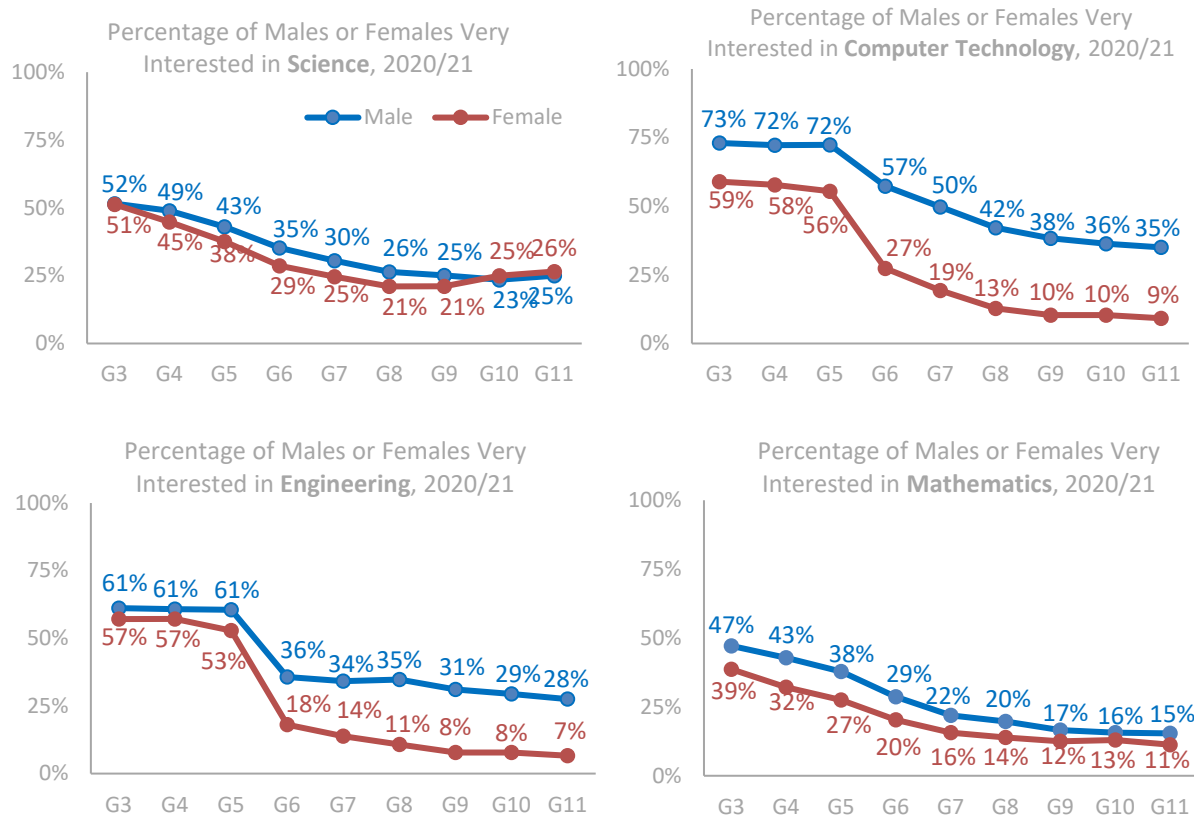


Figure 17. Percentage of males or females “very interested” in STEM-related subject areas by grade, 2020/21

- The proportion of students who are “very interested” in STEM careers is higher among students who are Black / African American, Hispanic, or Asian compared to White in grades 3 to 6 (Figure 18). Interest among students who are Asian remains high from grades 3 (45%) to 11 (47%), and interest declines only 6 percentage points for White students. In contrast, the proportion of Black / African American students who are “very interested” starts high at 44% in Grade 3 yet declines to 28% in Grade 11 (a net loss of -16), and drops from 42% among Hispanic students in Grade 3 to 29% in Grade 11 (-13 net loss).

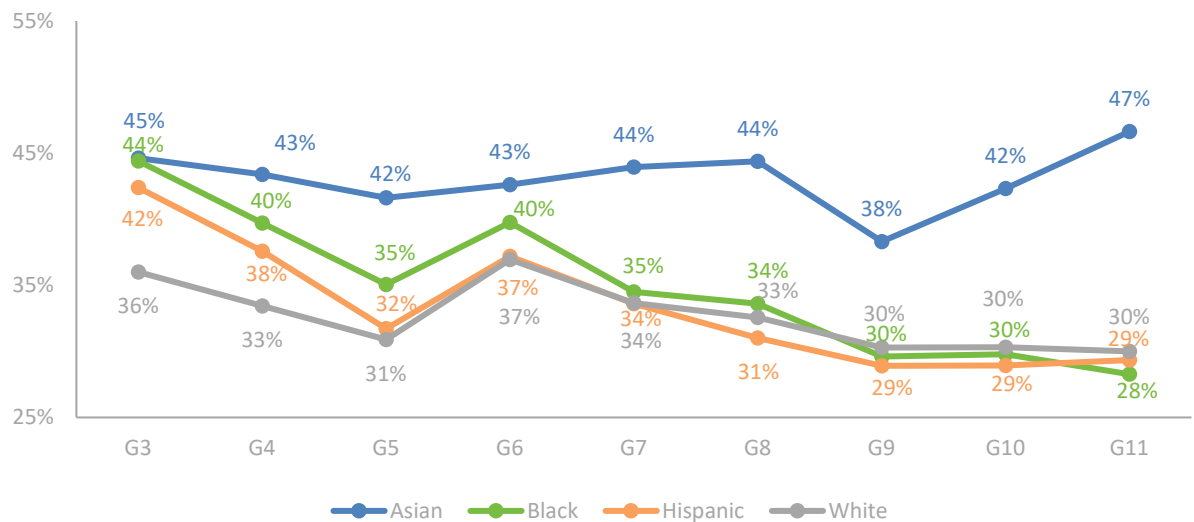


Figure 18. Percentage of all students statewide who said they were “very interested” in a STEM career by race/ethnicity, 2020/21

- A greater proportion of students who said they were “very interested” in a STEM career met Proficient or Advanced benchmarks in mathematics and science achievement on the Iowa Statewide Assessment of Student Progress (ISASP) compared to students who were “not very interested”, with the exception of females in mathematics (Figure 19).

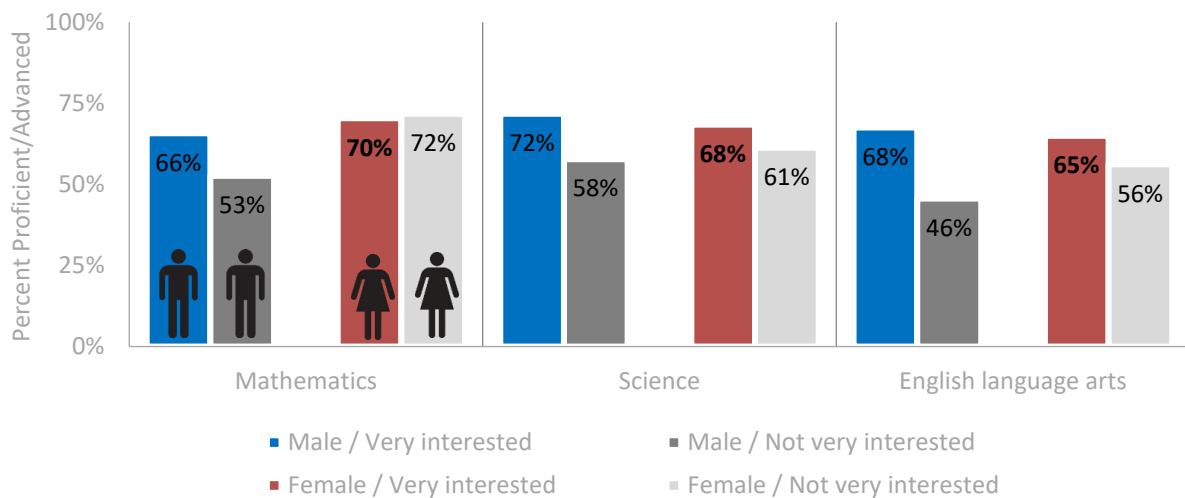


Figure 19. Percent of students Proficient or Advanced in Mathematics / Science / English language arts by level of interest in a STEM Career by gender, 2020/21

## Indicator 4: Number of students taking the ACT and average scores in mathematics, science, and STEM

Data source ACT, Inc.

Mathematics and science achievement on the ACT test is reported by year reflecting the performance of graduating seniors in that year who took the ACT test as a sophomore, junior, or senior and self-reported that they were scheduled to graduate in the respective year. Trends are compared from the most recent year available, 2020 (which reflects graduating seniors in 2020 who took the ACT during 2017/18, 2018/19, or 2019/20 academic years, respectively) to 2013 (which reflects graduating seniors in 2013 who took the ACT in 2010/11, 2011/12, or 2012/13). Data from 2019 are also included to assess the possible historical impact of the 2020 coronavirus pandemic.

Data on Iowa's graduating class of 2021 is not yet available as reported in previous years. Among Iowa's graduating class of 2021, 47% of students (n=17,658) took the ACT which is lower than previous classes.<sup>4</sup>

### Key findings

- Average ACT scores of graduating seniors in mathematics and science trended lower in 2019 and 2020 compared to 2013 (Table 8). In 2020, Iowa's average ACT score was 20.5 in mathematics and 21.3 in science, compared to 20.2 and 20.6 nationwide, respectively.
- Iowa's graduating class of 2020 who took the ACT achieved an average STEM score of 21.2 compared to 20.6 nationally, which reflects overall performance in mathematics and science.
- Disparities exist in average ACT scores by race/ethnicity with an average of 5 points lower among students who are Black / African American and an average of 3 points lower among students who are Hispanic compared to their White counterparts (Table 9).
- In 2020, 40% of graduating seniors in Iowa who took the ACT met benchmarks for mathematics and science, which was lower than both 2019 and 2013, a possible reflection of an overall trend downward since 2013 with an added historical bias of taking the test in a global pandemic year.
- By gender, the percent meeting college readiness benchmarks in mathematics decreased from 56% to 46% among males and from 45% to 36% among females between 2013 and 2020, respectively. The proportion of males and females who met college readiness benchmarks in science also decreased between 2013 and 2020, from 52% to 44% among males and 42% to 37% among females, respectively.
- Disparities exist among students by race/ethnicity with only 9% of Black / African American students and 19% of Hispanic students meeting benchmarks in mathematics, compared with 45% of White students in 2020. Compared to 2013, the percent of Hispanic students who met science benchmarks decreased from 24% to 20%, while the percent of Black / African American students decreased from 15% to 11% in the same time period.

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<sup>4</sup> <https://www.act.org/content/dam/act/unsecured/documents/2021/R2145-Grad-2021-Performance-by-EL-Status-2021-12.pdf>

Table 8. ACT scores and benchmarks for Iowa students, 2013-2020

		Iowa 2013 <sup>1</sup>		Iowa 2019	Iowa 2020	Trend since 2013	National 2020
Overall	Number of students tested	22,526	---	22,965	23,618	↑	1,670,497
	Proportion of graduating class	66%	---	66%	68%	↑	49%
	Average ACT scores <sup>2</sup>						
	Composite	22.1	---	21.6	21.1	↔	20.6
	Mathematics	21.6	---	21.0	20.5	↓	20.2
	Science	22.2	---	21.8	21.3	↓	20.6
	STEM	22.2	---	21.7	21.2	↓	20.6
	Percent meeting benchmarks <sup>3</sup>						
	Mathematics	50%	---	44%	40%	↓	38%
	Science	46%	---	44%	40%	↓	36%
	STEM	23%	---				20%
Males	Number of students tested	10,406	---	10,221	10,636	↑	773,062
	Average ACT scores						
	Composite	22.3	---	22.0	21.4	↓	20.5
	Mathematics	22.3	---	22.0	21.3	↓	20.6
	Science	22.8	---	22.5	21.8	↓	20.7
	STEM	22.8	---	22.5	21.8	↓	20.9
	Percent meeting benchmarks						
	Mathematics	56%	---	51%	46%	↓	40%
	Science	52%	---	50%	44%	↓	38%
Females	Number of students tested	12,091	---	12,627	12,482	↑	863,356
	Average ACT scores						
	Composite	21.9	---	21.4	21.1	↓	20.8
	Mathematics	21.0	---	20.3	20.1	↓	20.0
	Science	21.7	---	21.3	21.1	↓	20.5
	STEM	21.6	---	21.1	20.8	↓	20.5
	Percent meeting benchmarks						
	Mathematics	45%	---	39%	36%	↓	36%
	Science	42%	---	39%	37%	↓	35%

Source: ACT Profile Report: Graduating Class 2020, Iowa; ACT, Inc.

<https://www.act.org/content/act/en/research/services-and-resources/data-and-visualization/grad-class-database.html>

1. Year reflects performance of graduating seniors in that year who took the ACT as a sophomore, junior, or senior and self-reported that they were scheduled to graduate in the corresponding year.
2. Scores: Include an overall Composite Score and individual test scores in four subject areas (English, Mathematics, Reading, Science) that range from 1 (low) to 36 (high). The Composite Score is the average of the four test scores, rounded to the nearest whole number. The STEM score describes student overall proficiency in mathematics and science.
3. College Readiness Benchmarks: the minimum score needed on an ACT subject-area test to indicate a 50% chance of obtaining a B or higher or about a 75% chance of obtaining a C or higher in the corresponding credit-bearing college courses.

Table 9. ACT scores and benchmarks for Iowa students by student race/ethnicity, 2013-2020

		Iowa 2013 <sup>1</sup>		Iowa 2019	Iowa 2020	Trend since 2013	National 2020
White	Number of students tested	18,712	---	17,615	17,423	↑	860,496
	Average ACT scores <sup>2</sup>						
	Composite	22.5	---	22.3	22.0	↓	22.0
	Mathematics	21.9	---	21.6	21.3	↓	21.4
	Science	22.6	---	22.5	22.1	↓	21.9
	STEM			22.3	21.9		21.9
	Percent meeting benchmarks <sup>3</sup>						
	Mathematics	53%	---	49%	45%	↓	46%
	Science	49%	---	48%	45%	↓	45%
African American	Number of students tested	601	---	811	892	↑	203,517
	Average ACT scores <sup>2</sup>						
	Composite	17.3	---	16.6	16.3	↓	16.7
	Mathematics	17.4	---	16.8	16.3	↓	16.7
	Science	17.8	---	17	16.7	↓	16.9
	STEM			17.1	16.7		17
	Percent meeting benchmarks <sup>3</sup>						
	Mathematics	16%	---	13%	9%	↓	12%
	Science	15%	---	13%	11%	↓	12%
Hispanic	Number of students tested	1,204	---	1,711	2,130	↑	277,796
	Average ACT scores <sup>2</sup>						
	Composite	19.1	---	19.1	18.2	↓	18.5
	Mathematics	18.9	---	18.7	17.9	↓	18.5
	Science	19.4	---	19.5	18.5	↓	18.7
	STEM			19.4	18.5		18.8
	Percent meeting benchmarks <sup>3</sup>						
	Mathematics	27%	---	25%	19%	↓	24%
	Science	24%	---	25%	20%	↓	22%

Source: ACT Profile Report: Graduating Class 2020, Iowa; ACT, Inc.

<https://www.act.org/content/act/en/research/services-and-resources/data-and-visualization/grad-class-database.html>

1. Year reflects performance of graduating seniors in that year who took the ACT as a sophomore, junior, or senior and self-reported that they were scheduled to graduate in the corresponding year.
2. Scores: Include an overall Composite Score and individual test scores in four subject areas (English, Mathematics, Reading, Science) that range from 1 (low) to 36 (high). The Composite Score is the average of the four test scores, rounded to the nearest whole number. The STEM score describes student overall proficiency in mathematics and science.
3. College Readiness Benchmarks: the minimum score needed on an ACT subject-area test to indicate a 50% chance of obtaining a B or higher or about a 75% chance of obtaining a C or higher in the corresponding credit-bearing college courses.

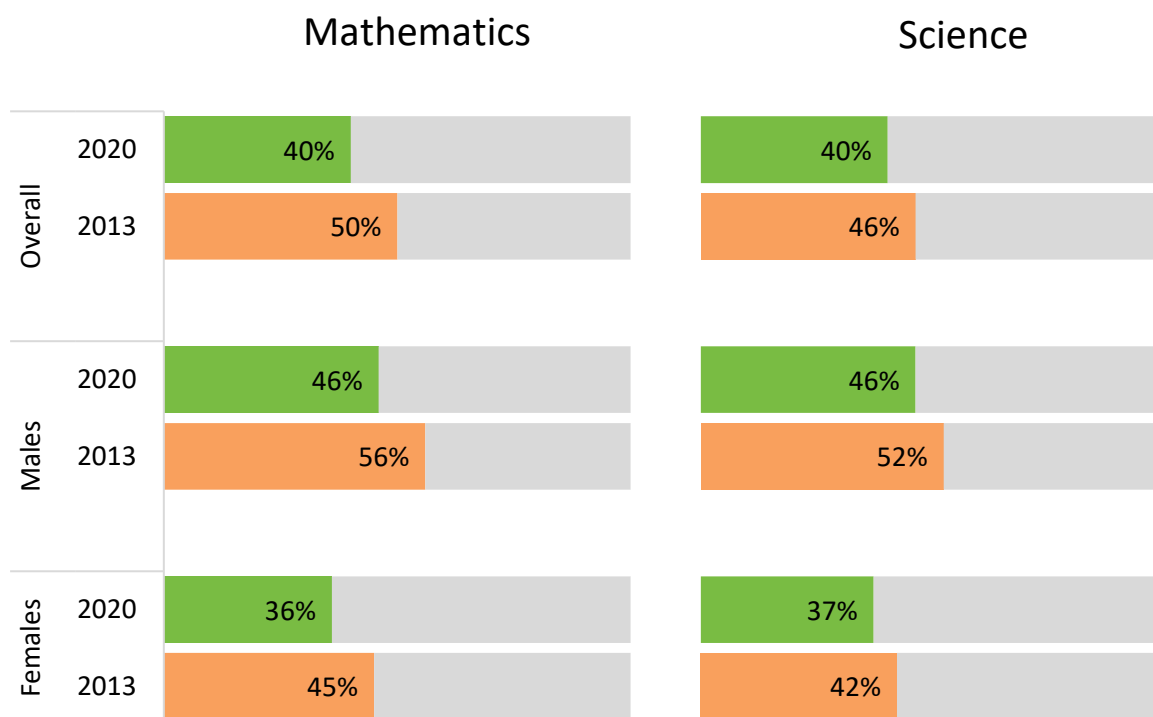


Figure 20. Percentage of Iowa graduating seniors meeting college readiness benchmarks in mathematics and science based on ACT scores by gender

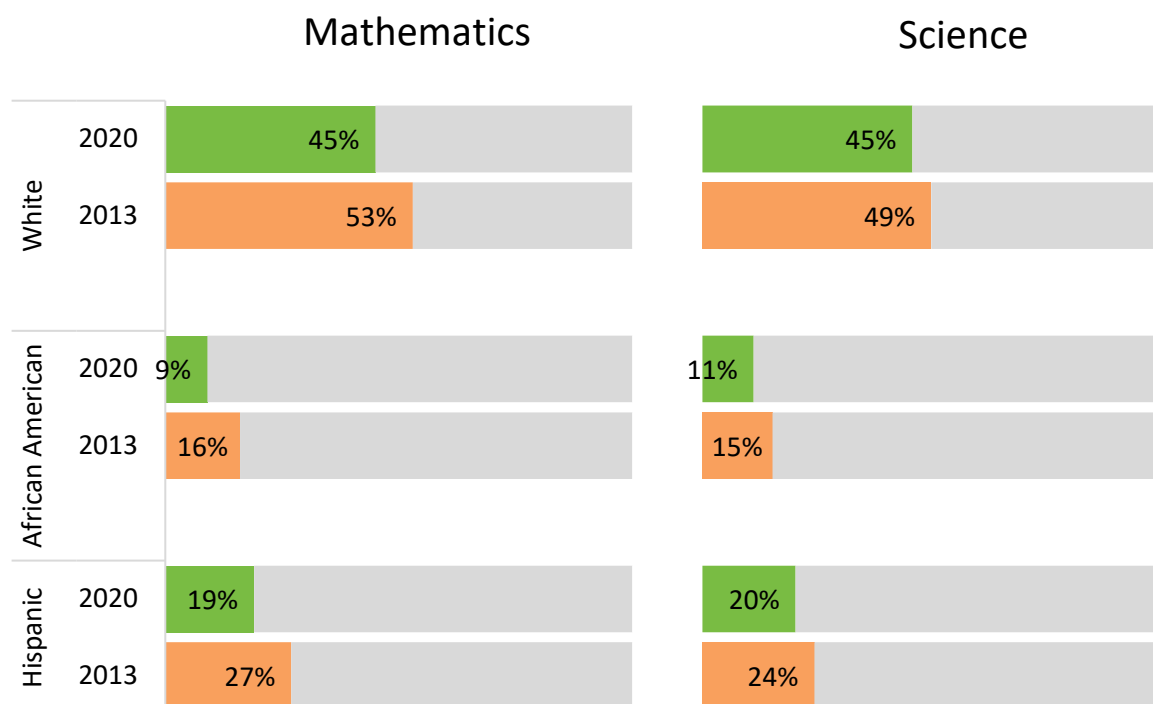


Figure 21. Percentage of Iowa graduating seniors meeting college readiness benchmarks in mathematics and science based on ACT scores by race/ethnicity



## Indicator 5: Enrollment in STEM-related courses in high school

**Data source** Iowa Department of Education, Bureau of Information and Analysis Services, 2020

Indicator 5 investigates the opportunities available for Iowa students to take basic and advanced level STEM courses in high school.

### Key findings

Table 10 provides the number of high school students statewide enrolled in each STEM-related subject area over a ten-year period. Trends in student enrollment in STEM-related courses compared data from the first year the Governor's STEM Advisory Council was established in 2011-2012 to the most current year. Note that core mathematics and science enrollment increases and decreases, in contrast to elective course enrollment trends, likely reflect population shifts.

- Over a ten year period, enrollment in science and math courses has increased, while enrollment in technology, engineering, and health courses has decreased.
- From 2019-2020 to 2020-2021, student enrollment decreased in each STEM-related subject area. Enrollment in science courses decreased 1%, in technology courses 7%, in engineering courses 39%, in math courses 2%, and in health courses 11%.
- Between 2011-2012 and 2020-2021, student enrollment in science courses increased by 11%.
- The number of students enrolled in technology courses has decreased by 27% from 2011- 2012 to 2020-2021.
- Enrollment in engineering-related courses increased every year from 2011-2012 until 2015-2016, when it declined for the first time. Enrollment in engineering courses has decreased 71% from 2011-2012 to 2020-2021.
- Between 2011-2012 and 2020-2021, the number of high school students enrolled in mathematics classes increased by 18%.
- Since 2011-2012, enrollment in health courses has decreased by 11%.
- The percentage of underrepresented minority students enrolled in STEM-subject areas has typically increased annually in the last eight years (Table 11). Enrollment by underrepresented minority students in science has increased by +6.8 percentage points, +1.8 in technology, +6.9 in mathematics, and +5 in health. Underrepresented minority student enrollment in engineering decreased (-3.1 points) in that same time period.

Table 10. Student enrollment in high school courses of STEM-related subject areas

	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	% Change 2011/12- 2020/21	% Change 2019/20- 2020/21
Science	73,150	73,633	73,996	74,178	75,997	75,195	76,869	78,112	82,262	81,497	+11%	-1%
Male	49.5%	49.6%	49.7%	49.4%	49.2%	49.1%	48.6%	48.4%	48.5%	48.31%		
Female	50.5%	50.4%	50.3%	50.6%	50.8%	50.9%	51.4%	51.6%	51.6%	51.69%		
Technology	7,818	7,791	7,032	7,239	7,086	6,889	6,755	6,293	6,163	5,728	-27%	-7%
Male	66.9%	69.2%	71.1%	73.9%	72.8%	73.2%	74.9%	74.5%	76.6%	76.45%		
Female	33.1%	30.8%	28.9%	26.1%	27.2%	26.8%	25.1%	25.5%	23.4%	23.55%		
Engineering	7,303	7,954	8,952	8,957	7,882	7,082	4,070	3,777	3,467	2,118	-71%	-39%
Male	84.1%	83.6%	83.5%	84.5%	83.6%	84.4%	87.1%	85.5%	83.8%	85.70%		
Female	15.9%	16.4%	16.5%	15.5%	16.4%	15.6%	12.9%	14.5%	16.2%	14.30%		
Mathematics	47,563	49,602	51,210	50,894	54,163	55,710	55,357	55,451	57,034	55,989	+18%	-2%
Male	49.3%	49.5%	49.5%	49.4%	49.1%	48.9%	49.1%	49.1%	49.0%	49.03%		
Female	50.7%	50.5%	50.5%	50.6%	50.9%	51.1%	50.9%	50.9%	51.0%	50.97%		
Health	343	412	373	296	364	397	398	274	340	304	-11%	-11%
Male	26.2%	31.3%	31.6%	24.7%	21.4%	24.7%	20.4%	29.2%	26.2%	26.98%		
Female	73.8%	68.7%	68.4%	75.3%	78.6%	75.3%	79.7%	70.8%	73.8%	73.02%		

Source: Iowa Department of Education, Bureau of Information and Analysis Services, 2020

Table 11. Percentage of students enrolled in STEM subject courses who are an underrepresented minority<sup>1</sup>

	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
Science	15.6%	16.5%	17.2%	18.4%	18.9%	20.2%	21.5%	22.4%
Technology	13.2%	14.1%	14.3%	14.9%	16.4%	14.4%	16.5%	15.0%
Engineering	14.3%	15.2%	13.5%	14.0%	17.3%	17.5%	17.5%	11.2%
Mathematics	9.5%	9.9%	12.0%	13.4%	14.0%	14.7%	15.5%	16.4%
Health	5.1%	5.4%	4.7%	11.1%	10.3%	8.4%	10.0%	10.2%

1. Underrepresented minority students include Black or African American, Hispanic/Latino, American Indian or Alaska Native, and Native Hawaiian or other Pacific Islander, including:  
 Hispanic/Latino (A person of Cuban, Mexican, Puerto Rican, Cuban, South or Central American, or other Spanish culture or origin, regardless of race.)  
 American Indian or Alaska Native (A person having origins in any of the original peoples of North and South America, including Central America, and who maintains tribal affiliation or community attachment.)  
 Black or African American (A person having origins in any of the Black racial groups of Africa.)  
 Native Hawaiian or Other Pacific Islander (A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.)

## Indicator 6: Number of students taking STEM-related Advanced Placement tests and average scores

Data source College Board

Key findings Data not yet available for 2021.

- From 2013 to 2020, the number of students taking Advanced Placement courses in STEM-related subjects increased from 5,355 to 5,817, as well as the number of students who qualified to receive college credit from these courses (from 3,461 in 2013 to 3,585 in 2020).

	2013		2016	2017	2018	2019	2020	% change since 2013
Number receiving STEM-related college credit	3,461	---	4,191	4,217	4,155	4,252	3,585	4%
Number taking AP STEM-related courses	5,355	---	6,537	6,552	6,527	6,801	5,817	9%

- Comparing 2013 to 2020, the proportion of students scoring 3 or better on the AP exam increased in Biology, Physics 1, Physics 2, Physics C: Electricity & Magnetism, and Physics C: Mechanics. However, the proportion decreased in Calculus AB, Calculus BC, Chemistry, Computer Science A, Computer Science Principles, and Statistics (Table 12).

Table 12. Percentage of Iowa high school students scoring 3 or higher on Advanced Placement exams in STEM-related topics

	2013 % (n) <sup>1, 2</sup>		2016 % (n)	2017 % (n)	2108 % (n)	2019 % (n)	2020 % (n)	Trend since 2013
Biology	70% (735)	---	71% (745)	74% (790)	66% (693)	70% (749)	71% (605)	↑
Calculus AB	59% (821)	---	61% (887)	61% (883)	59% (820)	59% (843)	55% (638)	↓
Calculus BC	77% (290)	---	77% (396)	84% (385)	79% (400)	83% (414)	73% (350)	↓
Chemistry	58% (462)	---	53% (533)	52% (514)	54% (522)	52% (474)	51% (449)	↓
Computer Science A	80% (94)	---	77% (163)	78% (182)	78% (179)	77% (197)	71% (204)	↓
Computer Science Principles		---		79% (85)	75% (129)	69% (224)	61% (189)	↓
Environmental Science	56% (227)	---	52% (275)	50% (206)	58% (240)	48% (200)	56% (197)	↔
Physics 1			51% (283)	54% (302)	55% (289)	51% (273)	57% (252)	↑
Physics 2			87% (59)	80% (61)	85% (52)	80% (66)	84% (52)	↑
Physics C: Elec. & Magnet.	61% (27)	---	76% (22)	59% (26)	59% (27)	71% (30)	65% (26)	↑
Physics C: Mechanics	67% (79)	---	81% (110)	90% (147)	80% (140)	82% (146)	82% (145)	↑
Statistics	69% (449)	---	73% (718)	64% (636)	67% (664)	61% (636)	60% (478)	↓

Source: AP Program Participation and Performance Data, 2013-2020, College Board

Retrieved from: <http://research.collegeboard.org/programs/ap/data>

1. College-level Advanced Placement (AP) courses are available to Iowa high school students through College Board in 22 subject areas. Optional tests are included with the AP courses. Scores can range from 1 to 5 with 3 or better indicating that the student is qualified to receive college credit in that topic. Percentages reflect the proportion of test takers within each subject who scored 3 or higher.
2. Number in parentheses indicates the numerator in the proportion.

## Indicator 7: Iowa concurrent enrollment in science and mathematics

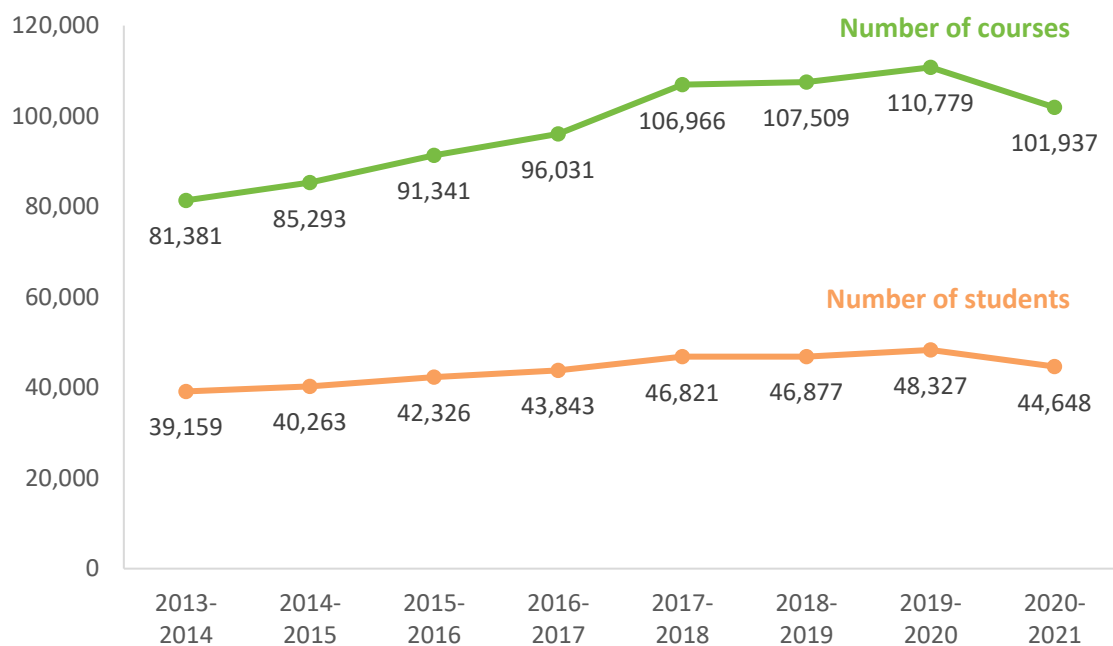
**Data sources** Annual Condition of Education Report 2021, December 2021, and Outcomes of Jointly Enrolled Students in Iowa, Iowa Department of Education, August 2021

This indicator tracks the concurrent enrollment and number of courses taken. The data are reported annually and compiled by the Iowa Department of Education for reporting of the Annual Condition of Education. Additional sources provide information about joint enrollment.

Iowa's community college offer concurrent enrollment courses through 28E agreements between school districts and community colleges. There are two course types offered: 1) the courses are designed for both college and high school students for concurrent credit offered by community colleges, or 2) the courses are designed for high school students offered by community colleges to bridge high school students to community college programs and typically provide coursework in science, technology, engineering, and mathematics (STEM) or other highly technical areas. The second type of course through 28E agreements between high school and community college are designed for career academy concurrent credit.

### Key findings

- In the academic year 2019-2020, a total of 51,800 unduplicated high school students jointly enrolled in community college courses, an all-time high.
- In the academic year 2019-2020, 40.8% of total community college enrollment came from jointly enrolled students.
- Figure 22 shows concurrent enrollment from 2013-2014 to 2020-2021. In 2020-2021 concurrent enrollment decreased 7.6% and the number of courses taken decreased 8.0% - the first year in the time series where there was a decrease compared to the previous year.
- Each year, more than 98 percent of Iowa districts (only those districts that had a public high school) had concurrent enrollments (Table 13). In 2020-2021, only one district with a public high school did not have concurrent enrollment.
- Concurrent enrollments by grade are displayed in Table 14. 2020-2021 was the first year to see a drop in total concurrent enrollment. Over the eight year time period, each grade level's proportion of total concurrent enrollment stayed fairly consistent: 9th grade students 6%-8%, 10th grade students 13%-15%, 11th grade students 32%-34%, and 12th grade students 45%-47%.
- Table 15 shows the concurrent enrollment courses taken in STEM-related subject areas for the past six years. The highest percentages of courses taken were in career technical / vocational education, followed by mathematics and science courses. 2020-2021 was the first year to see a decrease in enrollment for each subject area.



Source: Iowa Department of Education, Bureau of Information and Analysis, Student Reporting in Iowa, winter files.

Figure 22. Iowa concurrent enrollment and courses taken 2013/14 to 2020/21

Table 13. Iowa school districts with concurrent enrollment 2013/14 to 2020/21

Year	Total # of Districts	Districts with High Schools	Districts with Concurrent Enrollment	Percent of Districts with High Schools that had Concurrent Enrollment
2013-2014	346	314	310	98.7%
2014-2015	338	312	302	96.8%
2015-2016	336	310	304	98.1%
2016-2017	333	306	302	98.7%
2017-2018	333	304	302	99.3%
2018-2019	330	303	301	99.3%
2019-2020	327	302	302	100.0%
2020-2021	327	302	301	99.7%

Source: Iowa Department of Education, Bureau of Information and Analysis, Student Reporting in Iowa, winter files.

Retrieved from *The Annual Condition of Education*, Iowa Department of Education, 2021.

[https://educateiowa.gov/sites/files/ed/documents/2021ConditionOfEducation12\\_1\\_21.pdf](https://educateiowa.gov/sites/files/ed/documents/2021ConditionOfEducation12_1_21.pdf)

Table 14. Total number of Iowa school students taking concurrent enrollment courses 2013/14 to 2020/21

Year	9th Graders	10th Graders	11th Graders	12th Graders	Total Enrollment
2013-2014	2,748	5,056	12,858	18,497	39,159
2014-2015	3,013	5,421	13,204	18,625	40,263
2015-2016	3,414	6,039	13,668	19,205	42,326
2016-2017	3,279	6,017	14,871	19,676	43,843
2017-2018	3,512	6,691	15,555	21,063	46,821
2018-2019	3,088	6,891	15,737	21,161	46,877
2019-2020	3,155	7,029	16,543	21,600	48,327
2020-2021	2,542	6,349	15,289	20,468	44,648

Source: Iowa Department of Education, Bureau of Information and Analysis, Student Reporting in Iowa, winter files.

Retrieved from *The Annual Condition of Education*, Iowa Department of Education, 2021.

[https://eduteiowa.gov/sites/files/ed/documents/2021ConditionOfEducation12\\_1\\_21.pdf](https://eduteiowa.gov/sites/files/ed/documents/2021ConditionOfEducation12_1_21.pdf)

Table 15. Iowa concurrent enrollment courses taken by STEM-related subject area 2015/16 to 2020/21

Subject Area	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021
Mathematics	8,570 (9%)	8,909 (9%)	9,678 (9%)	9,745 (9%)	10,075 (9%)	9,678 (10%)
Science	3,624 (4%)	3,829 (4%)	4,483 (4%)	4,758 (4%)	4,658 (4%)	4,105 (4%)
Career technical / Vocational education	31,553 (35%)	36,617 (38%)	35,169 (33%)	32,836 (31%)	34,257 (31%)	29,656 (29%)
Total courses taken	91,341	96,031	106,966	107,509	110,779	101,937

Source: Iowa Department of Education, Bureau of Information and Analysis, Student Reporting in Iowa, winter files.

Retrieved from *The Annual Condition of Education*, Iowa Department of Education, 2021.

[https://eduteiowa.gov/sites/files/ed/documents/2021ConditionOfEducation12\\_1\\_21.pdf](https://eduteiowa.gov/sites/files/ed/documents/2021ConditionOfEducation12_1_21.pdf)



## Indicator 8: Number of current Iowa teachers with endorsements in K-8 STEM, 5-8 STEM, K-12 STEM specialist, 5-12 engineering, and/or 5-12 CTE Information Technology

**Data source** Basic Educational Data Survey (BEDS), Bureau of Information and Analysis Services, Iowa Department of Education

A collaborative effort of the Governor’s STEM Advisory Council and the Board of Educational Examiners (BOEE) led to the development of a STEM endorsement available to teachers and teacher candidates. Three endorsements—K-8 STEM, 5-8 STEM, and K-12 STEM Specialist—authorize educators to teach science, mathematics, and integrated STEM courses in grades Kindergarten through eighth grade, fifth through eighth grade, or Kindergarten through twelfth grade, respectively.<sup>5</sup> Endorsement in 5-12 engineering is also reported.

### Key findings

- Since 2014, 262 endorsements have been granted: 20 for K-8 STEM, 12 for 5-8 STEM, five for K-12 STEM Specialist, 52 for 5-12 Engineering, and 173 for 5-12 CTE Information Technology. (Table 16).
- In 2021, 14 endorsements were granted: 3 for K-8 STEM, 1 for 5-8 STEM, 0 for K-12 STEM Specialist, 4 for 5-12 Engineering, and 6 for 5-12 CTE Information Technology. (Figure 23).
- Eight Iowa colleges and universities currently offer K-8 and 5-8 STEM endorsements—Buena Vista University, Central College, Dordt University, Drake University, Grandview University, Morningside College, Saint Ambrose University, and the University of Northern Iowa (Table 19).
- Drake University is the only university to offer the K-12 STEM Specialist Endorsement.
- Dordt University is the only university to offer a 5-12 Engineering endorsement program.
- University of Northern Iowa is the only university to offer a CTE IT endorsement program.
- The University of Iowa offers a Master of Science in STEM Education, Drake University offers a Master of Science in Education in STEM, and the University of Northern Iowa offers a Minor in STEM Education.

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<sup>5</sup> See <https://boee.iowa.gov/endorsements/endorsements-list> for a description of the authorization, program requirements, and content for each.

Table 16. Number of Iowa educators with STEM endorsements, 2014-2021

STEM Area Endorsement <sup>1</sup>	2014	2015	2016	2017	2018	2019	2020	2021 <sup>2</sup>	Total
K-8 STEM	1	1	0	3	5	3	4	3	20
5-8 STEM	0	0	1	2	4	2	2	1	12
K-12 STEM Specialist	1	1	0	0	1	1	1	0	5
5-12 Engineering	1	5	8	14	7	6	7	4	52
5-12 CTE Information Technology	0	0	0	11	141	8	7	6	173

Source: Iowa Department of Education, Bureau of Information and Analysis Services, Basic Educational Data Survey (BEDS), 2021

1. Annual counts based on calendar year; conditional and standard licenses counted separately.

2. Counts from 1/1/2021 - 7/1/2021.

Table 17. Number of new STEM endorsements added per year by gender, 2014-2021

	2014	2015	2016	2017	2018	2019	2020	2021 <sup>2</sup>	Total
Men	1	4	6	12	69	9	7	5	113
Women	2	3	3	18	89	11	14	9	149

Source: Iowa Department of Education, Bureau of Information and Analysis Services, Basic Educational Data Survey (BEDS), 2021

1. Annual counts based on calendar year; conditional and standard licenses counted separately.

2. Counts from 1/1/2021 - 7/1/2021.

Table 18. Total endorsements by gender by STEM endorsement area, 2014-2021

STEM Area Endorsement <sup>1</sup>	Females	Males
K-8 STEM	17	3
5-8 STEM	10	2
K-12 STEM Specialist	4	1
5-12 Engineering	19	33
5-12 CTE Information Technology	99	74

Source: Iowa Department of Education, Bureau of Information and Analysis Services, Basic Educational Data Survey (BEDS), 2021

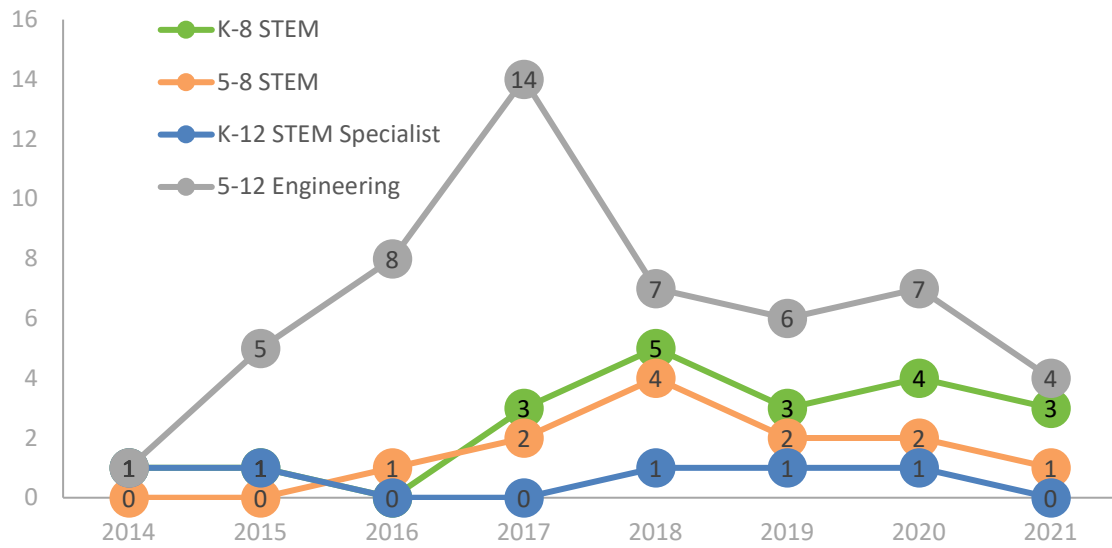


Figure 23. Number of Iowa educators receiving STEM endorsements, 2014-2021

Table 19. Iowa colleges and universities with STEM endorsement programs in 2021

College/ University <sup>1,2</sup>	K-8 STEM	5-8 STEM	K-12 STEM Specialist	5-12 Engineering	CTE Info. Tech	STEM Degree	STEM Education Minor
Buena Vista University	X	X					
Central College	X	X					
Dordt University	X	X		X			
Drake University	X	X	X			MSE in STEM Education	
Grandview University	X	X					
Morningside College	X	X					
Saint Ambrose University	X	X					
University of Iowa						MS in STEM Education	
University of Northern Iowa	X	X			X		Minor in STEM Education

Source: Iowa Board of Educational Examiners: <https://boee.iowa.gov/endorsement/k-8-stem>; <https://boee.iowa.gov/endorsement/5-8-stem>; <https://boee.iowa.gov/endorsement/k-12-stem-specialist>; <https://boee.iowa.gov/endorsement/5-12-engineering>; <https://boee.iowa.gov/endorsement/5-12-cte-information-technology>;

## Indicator 9: Community college awards in STEM fields

**Data source** Iowa Department of Education, Division of Community Colleges

Awards include diplomas, certificates, Associate's degrees, and other awards as identified and classified by the Iowa Department of Education Division of Community Colleges. The Iowa Department of Education classifies career and technical education programs into occupational "career clusters," following the National Career Clusters Framework. Four of these (architecture and construction, health sciences, information technology, and STEM) were tracked for the purposes of Indicator 11.

Note there are differences in operational definitions of STEM awards/degrees depending on the data source. In addition, defining "STEM degrees" is a moving target and may be more broad or narrow depending on the data source. Indicator 15 also includes information on STEM degrees from Iowa's community colleges using Classification of Instructional Programs (CIP) codes compared to awards as reported by career cluster here. STEM awards by career cluster will be broader in definition. STEM degrees defined by CIP codes will be more specific.

### Key findings

- In 2021, 5,285 students enrolled in Iowa's community colleges in degree fields categorized by career clusters in architecture and construction, information technology, and STEM. An additional 10,936 students were enrolled in health sciences (Table 16).
- When assessed by career cluster, enrollment in STEM fields has decreased 28% at Iowa's community colleges.
- A total of 6,393 awards in STEM-related fields as categorized by career cluster were awarded by Iowa's community colleges in 2021 (Table 21).
- Overall, the total number of awards in STEM-related degree fields from Iowa's community colleges increased 20% from 2013 to 2021. Notably in 2021, awards to minority graduates increased 63% compared to 2013.

Table 20. Community college enrollment by career cluster

Career cluster <sup>1</sup>	2013		2017	2018	2019	2020	2021	% Change 2013 to 2021
Architecture and Construction	2,082	---	1,653	1,481	1,473	1,465	1,584	-24%
Information Technology	2,607	---	2,510	2,341	2,126	2,213	2,300	-12%
Science, Technology, Engineering, and Mathematics	245	---	308	262	220	461	1401	472%
Health Science	17,600	---	12,629	11,679	11,265	10,871	10,936	-38%
TOTAL	22,534	---	17,100	15,763	15,084	15,010	16,221	-28%

Source: Iowa Department of Education, Division of Community Colleges. (2021).

*The annual condition of Iowa's community colleges: 2021.*

Retrieved from <https://www.educateiowa.gov/document-type/condition-community-colleges>

1. Definitions of Career Clusters can be obtained from <http://www.careerclusters.org/>

Table 21. Community college awards by career cluster

	2013		2017	2018	2019	2020	2021	% Change 2013 to 2021
<b>Architecture and Construction<sup>1,2</sup></b>								
Total	566	---	796	863	828	798	982	73%
Male <sup>3</sup>	521	---	754	812	784	748	914	75%
Female	32	---	38	47	43	48	67	109%
White	326	---	609	680	654	612	754	131%
Minority	79	---	158	162	155	160	203	157%
<b>Information Technology</b>								
Total	490	---	665	674	698	709	644	31%
Male	374	---	550	577	561	610	522	40%
Female	113	---	111	96	136	99	122	8%
White	330	---	531	509	522	529	477	45%
Minority	61	---	94	130	126	142	142	133%
<b>Science, Technology, Engineering, and Mathematics</b>								
Total	78	---	116	91	75	87	143	83%
Male	45	---	89	79	66	66	72	60%
Female	22	---	20	10	6	18	68	209%
White	53	---	87	68	55	67	103	94%
Minority	8	---	19	19	13	14	30	275%
<b>Health Science</b>								
Total	4,173	---	4,624	4,279	4,393	4,107	4,624	11%
Male	561	---	627	560	539	526	557	-1%
Female	3,584	---	3,985	3,705	3,828	3,575	4,063	13%
White	3,336	---	3,693	3,360	3,350	3,172	3,412	2%
Minority	706	---	745	759	827	807	1018	44%
<b>TOTAL<sup>3</sup></b>								
	<b>5,307</b>	---	<b>6,201</b>	<b>5,907</b>	<b>5,994</b>	<b>5,701</b>	<b>6,393</b>	<b>20%</b>
Male	1,501	---	2,020	2,028	1,950	1,950	2,065	38%
Female	3,751	---	4,154	3,858	4,013	3,740	4,320	15%
White	4,045	---	4,920	4,617	4,581	4,380	4,746	17%
Minority	854	---	1,016	1,070	1,121	1,123	1,393	63%

Source: Iowa Department of Education, Division of Community Colleges. (2021). *The annual condition of Iowa's community colleges: 2021*

Retrieved from <https://www.educateiowa.gov/document-type/condition-community-colleges>

1. Awards include diplomas, certificates, Associate's degrees, and "other" awards as identified and classified by the Iowa Department of Education Division of Community Colleges. The Iowa Department of Education classifies career and technical education programs into occupational "career clusters," following the National Career Clusters Framework.
2. Definitions of Career Clusters can be obtained from <http://www.careerclusters.org/>
3. Subgroup totals do not include students with unknown/unreported gender or race. Sums of subgroup data not equal to the total are due to missing data.

## Indicator 10: College and university degrees in STEM fields

**Data source** Integrated Postsecondary Education Data System (IPEDS)

This indicator includes information on bachelor's degrees, master's degrees, and doctoral degrees conferred by 4-year public universities, private non-profit colleges, and private for-profit colleges. Information on associate's degrees from Iowa's 2-year community colleges is also included here applying the same operational definition of STEM degrees and using the same data set as used to determine STEM degrees from Iowa's 4-year colleges and universities. This allows for better proportional comparisons by college type.

Note that the definition of what constitutes a "STEM degree" has evolved in the past five to ten years nationwide. The methods for the current annual report follow the methods used since 2014-2015. The tables below utilize a basic analysis of IPEDS database using a composite of primary 2-digit Classification of Instructional Programs (CIP) code categories that reflect STEM, STEM-related, and health science degrees. This is a modification of a more specific, 6-digit, CIP code definition of STEM degrees that was developed to correspond with the standard occupational classification (SOC) codes used in tracking STEM workforce developed by the Standard Occupational Classification Policy Committee (SOCPC) for the Office of Management and Budget. Additional documentation on the STEM classification process and recommendations can be found at [www.bls.gov/soc](http://www.bls.gov/soc).

### Key findings

- From 2012-2013 to 2019-2020, there has been a 5% increase in STEM awards at Iowa's 2-year community colleges, a 50% increase at 4-year public, and a 20% 4-year private (not-for-profit) colleges and universities, respectively (Table 22).
- During the same time period, health science degrees have decreased 1% overall at Iowa's 2-year and 4-year, public and private non-profit colleges and universities (Table 23).
- In 2019-2020, approximately 41% of the STEM and STEM-related degrees awarded by Iowa's 4-year public universities were conferred to females, compared to about 27% to females at Iowa's 2-year community colleges, and 17% at Iowa's 4-year, private not-for-profit colleges and universities (Table 24).
- The number of STEM and STEM-related degrees awarded to students who are Black / African American increased 102% at 4-year public and 73% at private, 4-year not-for profit colleges and universities in Iowa since 2012-2013 (Table 26).
- The proportions of degrees conferred upon Black / African American or Hispanic students has remained stable at around 3-4% of all degrees per year.



Table 22. Number of STEM and STEM-related degrees awarded by Iowa's 2-year and 4-year colleges and universities

STEM & STEM-Related (excludes Health Sciences)	2012/13		2015/16	2016/17	2017/18	2018/19	2019/20	Percent change, 2012/13 to 2019/20
2-year community colleges								
Associate's degree	1,175	---	1,152	1,196	1,105	1,079	1,231	5%
Subtotal	1,175	---	1,152	1,196	1,105	1,079	1,231	5%
4-year public universities								
Bachelor's	3,235	---	3,946	4,195	4,405	4,904	4,974	54%
Graduate/Professional	1,025	---	1,179	1,191	1,331	1,276	1,436	40%
Subtotal	4,260	---	5,125	5,386	5,736	6,180	6,410	50%
Private, 4-year, not-for-profit								
Associate's Degree	3	---	7	8	7	11	13	333%
Bachelor's	1,357	---	1,466	1,482	1,459	1,446	1,496	10%
Graduate/Professional	188	---	201	375	404	427	353	88%
Subtotal	1,548	---	1,674	1,865	1,870	1,884	1,862	20%
Total, non-profit	6,983	---	7,951	8,447	8,711	9,143	9,503	36%
Private, 4-year, for-profit								
Associate's Degree	456	---	211	251	260	62	72	-84%
Bachelor's	579	---	291	308	295	162	195	-66%
Graduate/Professional	202	---	143	126	99	0	0	
Subtotal	1,237	---	645	685	654	224	267	-78%
Grand total	8,220	---	8,596	9,132	9,365	9,367	9,770	19%

Source: National Center for Education Statistics, IPEDS Data Center, 2021

STEM & STEM related degrees include (2-digit CIP): Agriculture (01), Natural Resources (03), Architecture (04), Computer and Information Sciences (11), Engineering (14), Engineering Technologies (15), Biological Sciences (26), Mathematics and Statistics (27), and Physical Sciences (40).

Table 23. Number of health science degrees awarded by Iowa's 2-year and 4-year colleges and universities

Health Science Degrees	2012/13		2015/16	2016/17	2017/18	2018/19	2019/20	Percent change, 2012/13 to 2019/20
2-year community colleges								
Associate's degree	2,133	---	1,997	1,843	1,878	1,926	1,805	-15%
Subtotal	2,133	---	1,997	1,843	1,878	1,926	1,805	-15%
4-year public universities								
Bachelor's	435	---	571	539	546	537	583	34%
Graduate/Professional	949	---	844	895	933	892	797	-16%
Subtotal	1,384	---	1,415	1,434	1,479	1,429	1,380	0%
Private, 4-year, not-for-profit								
Associate's degree	308	---	222	163	137	151	135	-56%
Bachelor's	1,086	---	1,322	1,352	1,340	1,246	1,263	16%
Graduate/Professional	1,532	---	1,544	1,720	1,713	1,841	1,796	17%
Subtotal	2,926	---	3,088	3,235	3,190	3,238	3,194	9%
Total, non-profit	6,443	---	6,500	6,512	6,547	6,593	6,379	-1%
Private, 4-year, for-profit								
Associate's degree	989	---	1,474	1,198	826	9	12	-99%
Bachelor's	1,393	---	1,834	1,578	1,308	29	47	-97%
Graduate/Professional	455	---	792	990	1,085	0	2	-100%
Total, for-profit	2,837	---	4,100	3,766	3,219	38	61	-98%
Grand total	9,280	---	10,600	10,278	9,766	6,631	6,440	-31%

Source: National Center for Education Statistics, IPEDS Data Center, 2021

Degrees include (2-digit CIP): Health Science (51).

Table 24. Gender distribution of STEM and STEM-related degrees awarded by Iowa's 2-year and 4-year colleges and universities

STEM & STEM-Related (excludes Health Sciences)	2012-2013				2019-2020				Percent change, 2012/13 to 2019/20
	Associate's	Bachelor's	Graduate/ Professional	Subtotal	Associate's	Bachelor's	Graduate/ Professional	Subtotal	
2-year public universities	1,175			1,175	1,231			1,231	5%
Male	961			82%	897			73%	-7%
Female	214			18%	334			27%	56%
4-year public universities		3,235	1,025	4,260		4,974	1,436	1,436	-66%
Male		2,227	704	69%		3,370	853	59%	-71%
Female		1,008	321	31%		1,604	583	41%	-56%
Private, 4-year, not-for-profit	3	1,357	188	1,548	13	1,496	353	353	-77%
Male	3	763	148	59%	13	845	293	83%	-68%
Female	0	594	40	41%	0	651	60	17%	-91%
Private, 4-year, for-profit	456	579	202	1,237	72	195		267	-78%
Male	358	411	127	72%	60	159		82%	-76%
Female	98	168	75	28%	12	36		18%	-86%

Source: National Center for Education Statistics, IPEDS Data Center, 2021

STEM & STEM related degrees include (2-digit CIP): Agriculture (01), Natural Resources (03), Architecture (04), Computer and Information Sciences (11), Engineering (14), Engineering Technologies (15), Biological Sciences (26), Mathematics and Statistics (27), and Physical Sciences (40).

Table 25. Gender distribution of health science degrees awarded by Iowa's 2-year and 4-year colleges and universities

Health Sciences									Percent change, 2012/13 to 2019/20
2012-2013					2019-2020				
	Associate's	Bachelor's	Graduate/ Professional	Subtotal	Associate's	Bachelor's	Graduate/ Professional	Subtotal	
2-year public universities	2,133			2,133	1,805			1,805	-15%
Male	214			10%	185			10%	-14%
Female	1,919			90%	1,620			90%	-16%
4-year public universities		435	949	1,384		583	79	1,380	0%
Male		52	330	28%		70	285	26%	-7%
Female		383	619	72%		513	512	74%	2%
Private, 4-year, not-for-profit	308	1,086	1,532	2,926	135	1,263	1,796	3,194	9%
Male	41	140	658	29%	12	154	688	27%	2%
Female	267	946	874	71%	123	1,109	1,108	73%	12%
Private, 4-year, for-profit	989	1,393	455	2,837	12	47	2	61	-98%
Male	55	195	56	11%	1	15	2	30%	-94%
Female	934	1,198	399	89%	11	32	0	70%	-98%

Source: National Center for Education Statistics, IPEDS Data Center, 2021.  
Degrees include (2-digit CIP): Health Science (51).

Table 26. Racial/ethnic distribution of STEM and STEM-related degrees awarded by Iowa's 2-year and 4-year colleges and universities

STEM & STEM-Related (excludes Health Sciences)	2012-2013				2019-2020				Percent change, 2012/13 to 2019/20
	Associate's	Bachelor's	Graduate/ Professional	%	Associate's	Bachelor's	Graduate/ Professional	%	
2-year community colleges									
White	1,040			89%	1,026			95%	-1%
African American	13			1%	48			4%	269%
Hispanic	22			2%	48			4%	118%
Other	100			9%	109			10%	9%
4-year public universities									
White		2,556	501	72%		3,560	638	68%	37%
African American		40	23	1%		95	32	2%	102%
Hispanic		85	22	3%		222	40	4%	145%
Other		554	479	24%		1,097	726	29%	76%
Private, 4-year, not-for-profit									
White	2	1107	23	73%	12	1,079	31	60%	-1%
African American	0	37	8	3%	0	53	25	4%	73%
Hispanic	0	49	1	3%	0	74	1	4%	50%
Other	1	164	156	21%	1	290	296	31%	83%
Private, 4-year, for-profit									
White	277	200	66	44%	40	91		7%	-76%
African American	55	55	29	11%	4	12		7%	-88%
Hispanic	20	19	17	5%	5	10		7%	-73%
Other	104	305	90	40%	23	82		47%	-79%
Total									
White	1,319	3,863	590	70%	1,078	4,730	669	69%	12%
African American	68	132	60	3%	52	160	57	3%	3%
Hispanic	42	153	40	3%	53	306	41	4%	70%
Other	205	1,023	725	24%	133	1,469	1,022	28%	34%
Grand Total	1,634	5,171	1,415		1,316	6,665	1,789		19%

Source: National Center for Education Statistics, IPEDS Data Center, 2021

STEM & STEM related degrees include (2-digit CIP): Agriculture (01), Natural Resources (03), Architecture (04), Computer and Information Sciences (11), Engineering (14), Engineering Technologies (15), Biological Sciences (26), Mathematics and Statistics (27), and Physical Sciences (40).

Table 27. Racial/ethnic distribution of health science degrees awarded by Iowa's 2-year and 4-year colleges and universities

Health Sciences	2012-2013				2019-2020				Percent change, 2012/13 to 2019/20
	Associate's	Bachelor's	Graduate/ Professional	%	Associate's	Bachelor's	Graduate/ Professional	%	
2-year public universities									
White	1,862			87%	1,457			81%	-22%
African American	60			3%	96			5%	60%
Hispanic	48			2%	107			6%	123%
Other	163			8%	145			8%	-11%
4-year public universities									
White		367	733	79%		485	620	80%	0%
African American		5	18	2%		12	17	2%	26%
Hispanic		10	20	2%		31	35	5%	120%
Other		53	178	17%		55	125	13%	-22%
Private, 4-year, not-for-profit									
White	272	928	1,277	85%	113	1,017	1,358	78%	0%
African American	6	39	21	2%	4	57	48	3%	65%
Hispanic	11	25	48	3%	7	50	121	6%	112%
Other	19	94	186	10%	11	139	269	13%	40%
Private, 4-year, for-profit									
White	438	506	115	37%	4	14	0	30%	-98%
African American	91	140	102	12%	2	7	1	16%	-97%
Hispanic	46	56	14	4%	2	2	0	7%	-97%
Other	414	691	224	47%	4	24	1	48%	-98%
Grand Total									
White	2,572	1,801	2,125		1,574	1,516	1,978	79%	-22%
African American	157	184	141		102	76	66	4%	-49%
Hispanic	105	91	82		116	83	156	6%	28%
Other	596	838	588		160	218	395	12%	-62%
Grand Total	3,430	2,914	2,936		1,952	1,893	2,595	100%	-31%

Source: National Center for Education Statistics, IPEDS Data Center, 2021  
Health Science related degrees include (2-digit CIP): Health Sciences (51).

## Indicator 11: Percentage of Iowans in workforce employed in STEM occupations

Data source Iowa Workforce Development

There was no new data to report for 2021.

### Key findings

- Approximately 22% of Iowa's occupations are in STEM fields (Table 28).
- From 2018-2028, Iowa's STEM occupations are expected to grow 0.9% annually, compared to a 0.8% annual growth rate across all occupations (Table 29).
- On average in 2020, individuals in STEM occupations earned \$33.77 mean wages and \$70,250 in mean salaries, compared to all occupations overall earning \$22.76 in mean wages and \$47,334 in mean salaries, respectively (Table 29).

Table 28. Percentage of Iowans in workforce employed in STEM occupations

Time period	Total STEM employment	Total employment (all occupations)	% STEM of all occupations
2008-2018	358,960	1,762,260	20%
2010-2020	267,765	1,717,020	16%
2012-2022	257,230	1,758,205	15%
2014-2024	298,510	1,795,100	17%
2016-2026	383,300	1,821,755	21%
2018-2028	411,985	1,833,700	22%

Source: Communications and Labor Market Information Division, Iowa Workforce Development  
Available at: <http://www.iowaworkforcedevelopment.gov/2018-2028-stem-jobs-outlook-statewide>

Table 29. Iowa estimated employment in STEM fields: Projections, growth, and salaries, 2018-2028

	2018 Estimated employment	2028 Projected employment	Annual growth rate	2020 Mean Wage (\$)	2020 Mean Salary (\$)
Management	113,225	116,625	0.3	\$50.62	\$105,287
Business & Financial Operations	26,005	28,685	1.0	\$34.55	\$71,863
Computer & Mathematical	34,670	39,520	1.4	\$39.57	\$82,309
Architecture & Engineering	22,000	23,690	0.8	\$34.30	\$71,354
Life, Physical, & Social Science	12,465	13,715	1.0	\$30.13	\$62,661
Postsecondary Business, Biological Science, & Nursing Teachers	9,355	10,915	1.7	\$44.56	\$92,695
Healthcare Practitioners & Technical	89,300	102,260	1.5	\$38.50	\$80,080
Healthcare Support	15,070	17,830	1.8	\$18.19	\$37,840
Installation, Maintenance, & Repair	28,195	30,580	0.8	\$24.29	\$50,515
Production	19,090	19,600	0.3	\$25.52	\$53,088
Other <sup>2</sup>	42,610	46,765	1.0	\$27.77	\$57,769
Total STEM Occupations <sup>1</sup>	411,985	450,185	0.9	\$33.77	\$70,250
Total All Occupations	1,833,700	1,966,270	0.7	\$22.76	\$47,334

Source: Communications and Labor Market Information Division, Iowa Workforce Development. Available at [www.iowaworkforcedevelopment.gov/sites/search.iowaworkforcedevelopment.gov/files/documents/2018/stemjobs\\_statewide\\_112018.pdf](http://www.iowaworkforcedevelopment.gov/sites/search.iowaworkforcedevelopment.gov/files/documents/2018/stemjobs_statewide_112018.pdf)

1. The acronym STEM, as used in this table, is a combined occupational group comprised of occupations from existing and/or established occupational groups adopted from the Office of Management and Budget's (OMB) Standard Occupational Classification (SOC) Manual. These occupations have a preponderance of tools and skills from science, technology, engineering, and/or mathematics. STEM occupations were defined using criteria by Iowa Workforce Development (IWD) and/or recommended by the SOC Policy Committee for OMB.
2. Other includes first-line supervisors of food preparation/servers, institutional/cafeteria cooks, graphic designers, audio/video/broadcast technicians, construction workers, animal breeders, first-line supervisors of farming/fishing/forestry workers, forest/conservation workers, electricians, plumbers/pipefitters/steamfitters, detectives/criminal investigators, statistical assistants, commercial pilots & air traffic controllers, and technology & scientific sales representatives & engineers.



## Indicator 12: Job vacancy rates in STEM occupational areas

**Data source** Iowa Workforce Assessment Survey, Iowa Workforce Development

The Workforce Needs Assessment Survey is conducted by Iowa Workforce Development each year with Iowa employers to assess the demand and skills required for jobs in several sectors of the workforce.

**There was no new data to report for 2020-2021.**

### Key findings

- In 2018, there were an estimated 14,280 vacancies in STEM jobs statewide (Table 30).

Table 30. Estimated job vacancy rates in STEM occupational areas

Occupational Categories <sup>1</sup>	2012/13		2014/15		2016/17		2018	
	Vacancy Rate	Est. Vacancy	Vacancy Rate	Est. Vacancy	Vacancy Rate	Est. Vacancy	Vacancy Rate	Est. Vacancy
Architecture and Engineering	3%	593	6%	1,047	5%	860	3%	644
Community and Social Services	2%	355	3%	720	6%	1,313	4%	839
Computer and Mathematical Science	3%	752	6%	1,887	1%	435	2%	590
Farming, Fishing, and Forestry	3%	148	12%	683	16%	881	6%	305
Healthcare Practitioner and Technical	2%	1,837	3%	2,847	5%	4,128	3%	2,339
Healthcare Support	4%	1,678	3%	1,205	10%	4,672	8%	3,106
Life, Physical, and Social Science	1%	116	3%	355	1%	155	1%	97
Production	4%	3,870	2%	2,593	3%	5,335	4%	6,360
Total Estimated Vacancies <sup>2</sup>		9,349		11,337		17,779		14,280

Source: Iowa Workforce Needs Assessment, Iowa Workforce Development, 2019

<https://www.iowaworkforcedevelopment.gov/wna>

- Occupational Categories not included in this table are: Arts, Design, Entertainment, Sports, & Related; Building & Grounds Cleaning & Maintenance; Business & Financial Ops; Construction & Extraction; Education, Training, & Library; Food Preparation & Serving Related; Installation, Maintenance, & Repair; Legal; Management; Office & Administrative Support; Personal Care & Service; Protective Service; Sales & Related; and Transportation & Material Moving.
- Vacancy data derived from the Iowa Workforce Development job bank and reported in the Workforce Needs Assessment report for each respective year. Data may be limited for making longitudinal comparisons due to the changing number of employer websites that are indexed on the job bank in any given year. Numbers are also subject to changes in employers' job posting strategies. For example, over the course of three years, an employer may change their job-posting strategy and become more aggressive about posting and re-posting jobs, which would result in a big jump in the number of openings over the course of time.

## Section 3. Statewide STEM Survey

To assess change in public awareness and attitudes toward STEM, a statewide public survey of Iowans was conducted from June to October 2021. The survey has been conducted annually by the University of Northern Iowa, Center for Social and Behavioral Research since 2012 in the spring/summer. In 2021, just over 1,000 Iowans from across the state participated in the telephone survey of both landline and cellular telephone numbers, and online. Results were weighted to obtain point estimates that are representative of the adult population of Iowans.

This section highlights some of the results from the 2021 statewide survey with some comparisons to findings from previous years. For a full description of survey results, including methodology, survey instrument, item frequencies, and weighting information, please refer to the technical report for the 2021 statewide survey.

### 2021 Survey Highlights

#### STEM awareness

To assess awareness of STEM, Iowans were asked “STEM stands for ‘science, technology, engineering, and mathematics.’ Have you read, seen, or heard of this before?” Nearly two-thirds of Iowans (62%) had heard something in the past few months about PreK-12 STEM education in general. When asked specifically about the STEM acronym, 7 in 10 Iowans (72%) of Iowans had read, seen, or heard of STEM (Figure 24).

#### HAVE YOU READ, SEEN, OR HEARD OF STEM? 2021

*Seven in ten Iowans (72%) said ‘Yes.’ Awareness of STEM is significantly higher than measured in 2018 and prior years.*

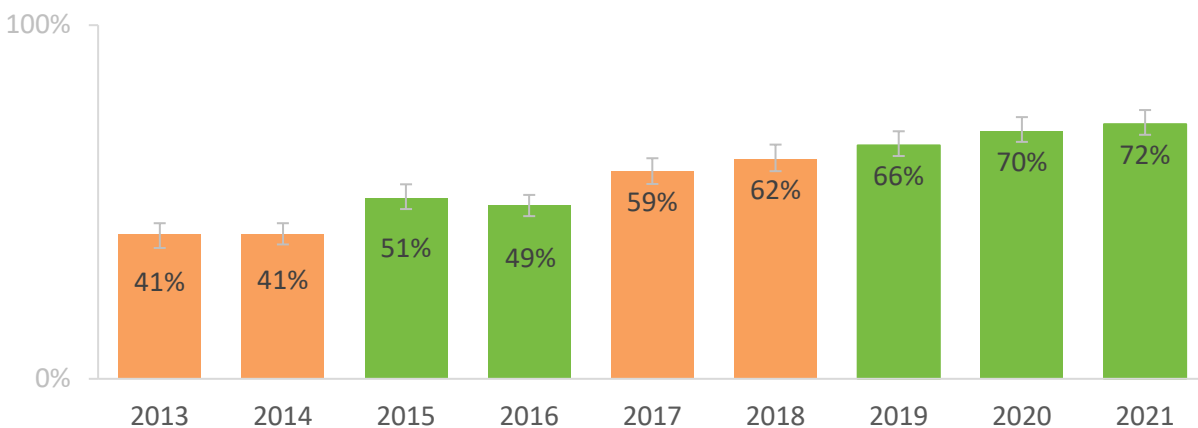


Figure 24. STEM stands for ‘science, technology, engineering, and mathematics.’  
Have you read, seen, or heard of this before? (% Yes)

Chi-square tests of significance were used to compare awareness of STEM across select demographic variables. Subgroup analyses are useful for identifying which characteristics of lowans may be associated with more or less awareness of STEM. Bivariate analysis of awareness of STEM by gender (n/s), education (p<.01), parent status (n/s), and place of residence (n/s) is presented in Figure 25.

#### AWARENESS OF STEM BY POPULATION SUBGROUPS FROM 2013 TO 2021

*Subgroup differences remain, yet awareness of STEM has increased from +20 to +37 points for nearly all subgroups since 2013. In 2021, a greater proportion of lowans with some college education or more had awareness of STEM compared to lowans with a high school education or less (p<.01).*

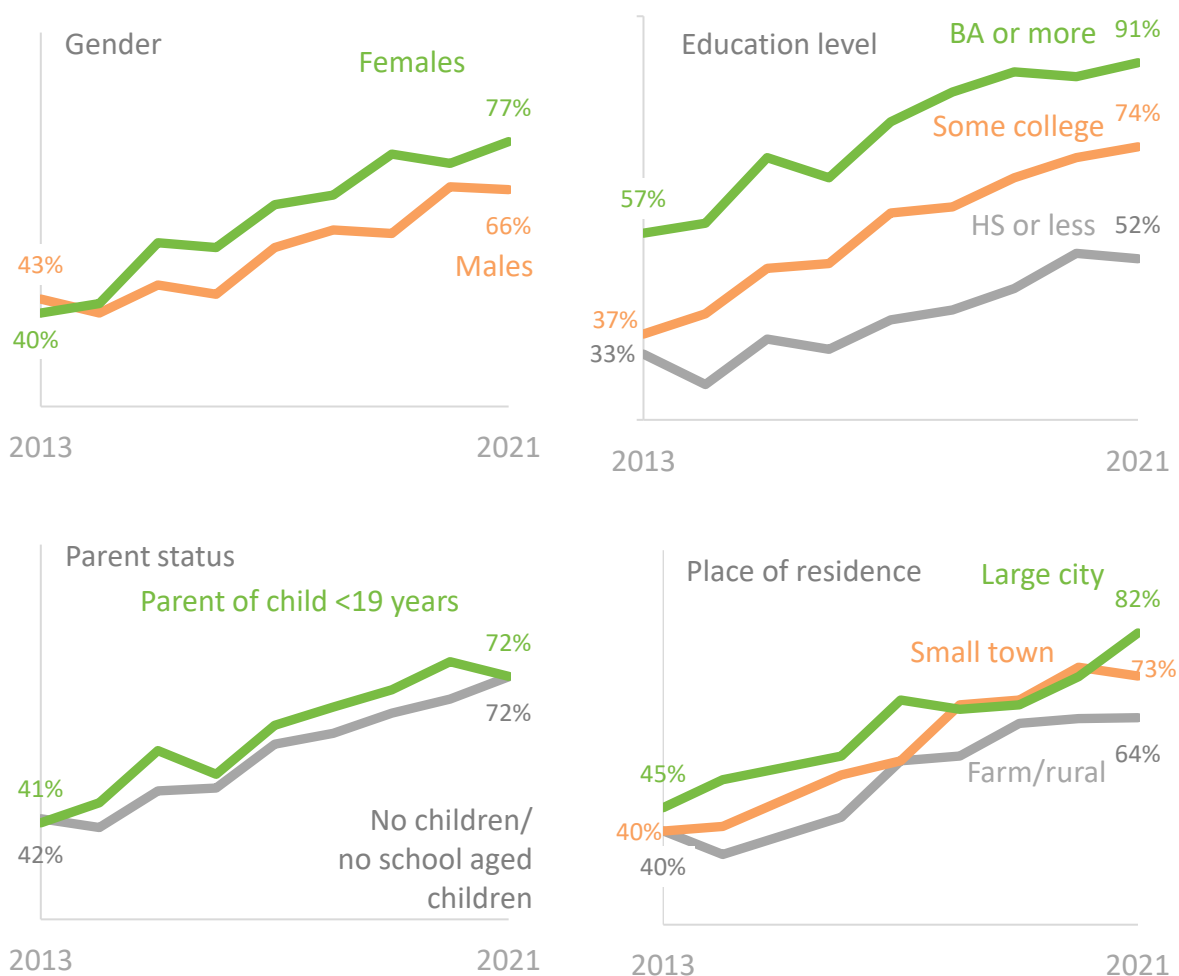


Figure 25. Trends in awareness of STEM by demographic subgroup, 2013-2021

All six STEM regions have shown an increase in STEM awareness with the increases in the Northwest, North Central, Northeast, South Central, and Southeast STEM regions reaching statistical significance when comparing 2021 to 2014. Confidence intervals were used to determine statistical significance. The point estimate and 95% confidence intervals sets forth the upper and lower range of the “true” percentage in the population, so even though a trend upward or downward may be observed when comparing regions from one year to the next or with each other, the increase or decrease does not reach statistical significance when the 95% confidence intervals overlap.

#### INCREASE IN STEM AWARENESS BY STEM REGION FROM 2014 TO 2021

*Awareness of STEM has increased significantly in Northwest, North Central, Northeast, South Central, and Southeast STEM regions compared to 2021.*

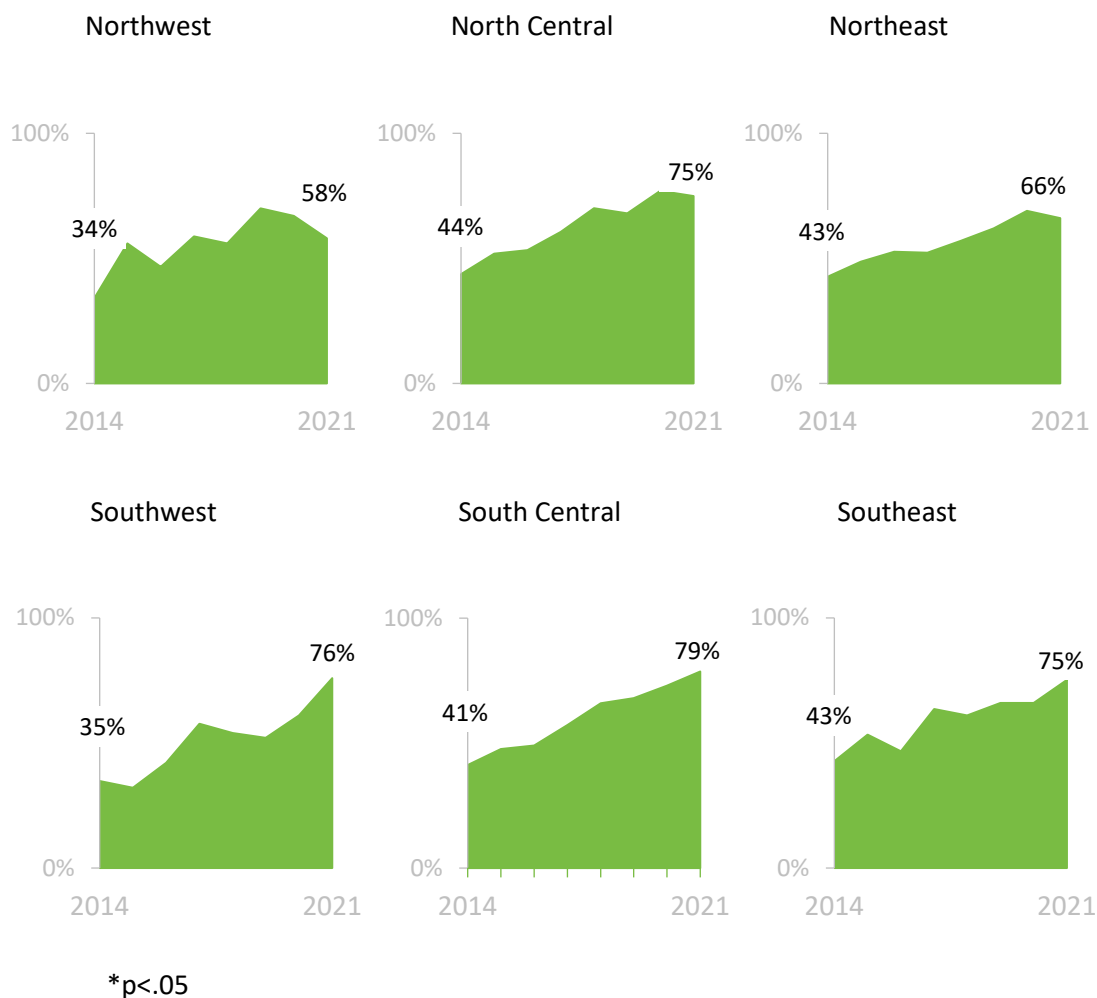


Figure 26. Awareness of STEM by STEM region, 2014 to 2021

Awareness of statewide efforts to improve STEM education was also assessed by asking Iowans if they have read, seen, or heard anything about specific groups or events promoting STEM education and careers in Iowa or the phrases *Greatness STEMs from Iowans* and *Tomorrow STEMs from Iowans* (Figure 27). For comparison, the proportions in gray in the figure show the percentage of Iowans with awareness of the respective event or activity from 2018. Not all events or activities are queried annually.

When asked directly, 10% of Iowans recognized the slogan *Tomorrow STEMs from Iowans* and 27% of Iowans recognized *Future Ready Iowa*. To assess possible response bias, Iowans were also asked about one other slogan that to our knowledge had not been used in Iowa. Of this fabricated slogan, 10% said they had heard the slogan *STEM for the ages!* This suggests there may be some response bias among respondents since the slogan *Tomorrow STEMs from Iowans* is similarly recognized to one that has not been used in Iowa and to interpret these findings with caution.

#### AWARENESS OF GROUPS AND EVENTS PROMOTING STEM EDUCATION AND CAREERS

*In the past year, four in ten (42%) Iowans had heard of a STEM event or programming in their local school district; and approximately one-quarter (23%) had heard of STEM Day at the Iowa State Fair or the STEM Advisory Council (24%). Almost one in five Iowans (18%) had heard of Iowa STEM BEST school-business partnerships.*

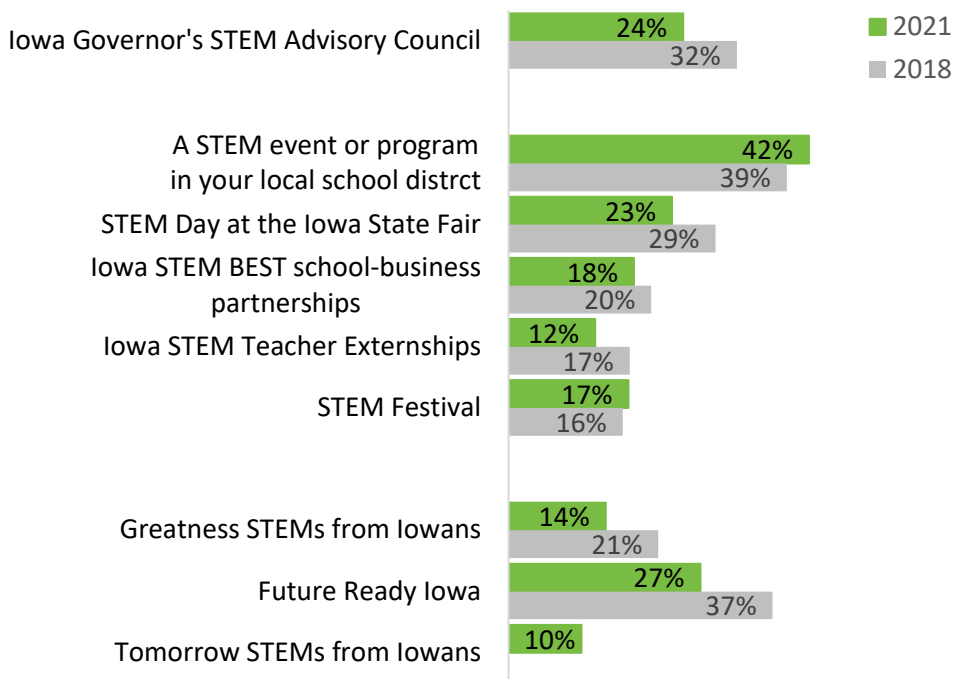


Figure 27. I'm going to read a short list of some groups promoting STEM education and careers. Please tell me how much you have heard, if anything, about each one in the past year.

## Interest and Attitudes toward STEM and the role of STEM in Iowa

Interest in STEM education was assessed by asking, “In general, how interested, if at all, are you in the topic of preK-12 STEM education.” Nearly two-thirds of Iowans indicated they were *Somewhat interested* (36%) or *Very interested* (29%) in the topic of preK-12 STEM education.

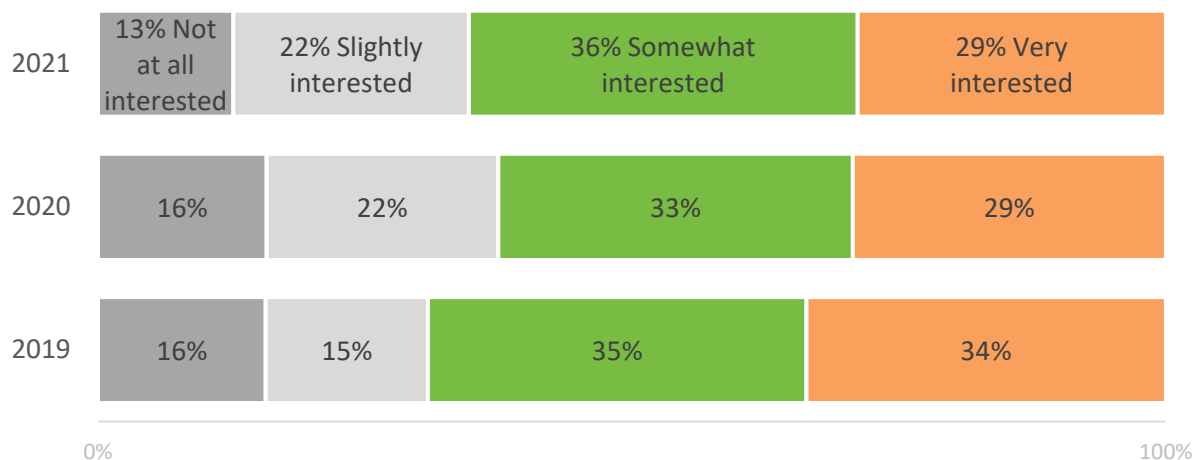


Figure 28. In general, how interested, if at all, are you in the topic of preK-12 STEM education?

## Perceptions about STEM education

The statewide survey also assessed support for STEM education in Iowa and views about how well schools in their community are teaching STEM subjects. Much like previous years, nine in ten Iowans (95%) said STEM education **should** be a priority in their local school district, yet only 58% said STEM education actually **is** a priority and another 12% said they did not know if STEM education was a priority in their local school district. While still discrepant, this has been improving over time compared to 2015 when less than half (47%) said STEM education was a priority and one in five (22%) did not know.

### IOWANS CONTINUE TO SUPPORT PRIORITIZING STEM EDUCATION

**9 in 10** Iowans think STEM education **should** be a priority in their local school districts, yet only 58% say it **is** a priority and another 12% **don't know**. **5 in 10** Iowans agree the quality of STEM education in Iowa is high.

Do you think STEM education  
**is a priority**  
in your local school district?

**58%**

(29% said No, 12% Don't Know)

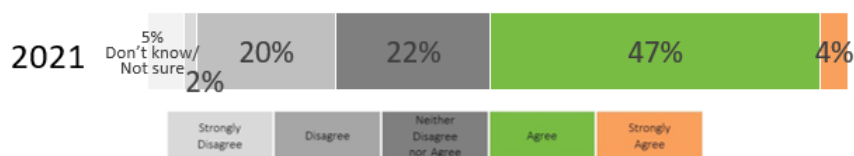
Do you think STEM education  
**should be a priority**  
in your local school district?

**95%**

## IOWANS VIEW OF THE QUALITY OF STEM EDUCATION IN IOWA

**5 in 10** Iowans agree the quality of STEM education in Iowa is high.

**5 in 10** Iowans agree that overall,  
the quality of STEM education in Iowa is high.



## OVERALL SUPPORT FOR STEM EFFORTS REMAINS HIGH

A large majority (86%) of Iowans support efforts to devote resources and develop initiatives to promote STEM education in Iowa; among those, over half (53%) said they were very supportive.

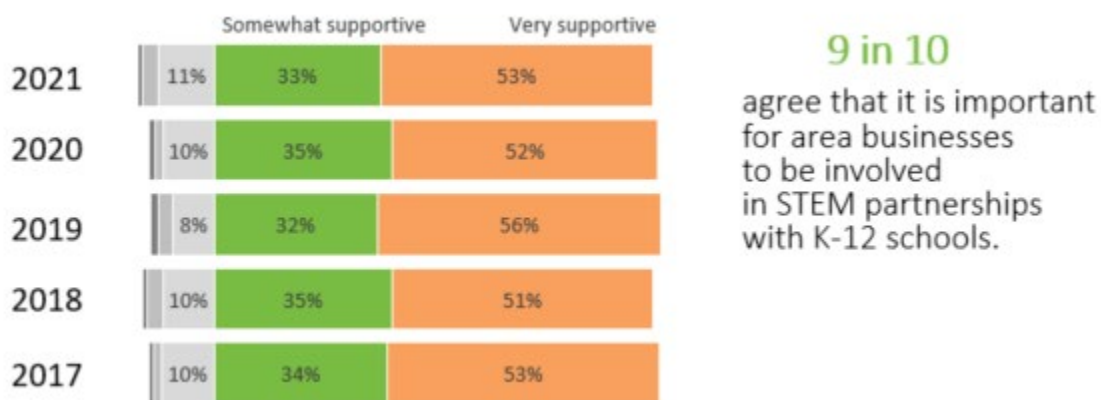


Figure 29. Overall, to what degree do you support or oppose state efforts to devote resources and develop initiatives to promote STEM education in Iowa?

### PERCEPTIONS OF QUALITY OF EDUCATION

Nearly two-thirds of lowans rated the quality of science, technology, and mathematics education in their community as 'Excellent' or 'Good,' while less than half (39%) of lowans rated the quality of engineering education in their community that way.

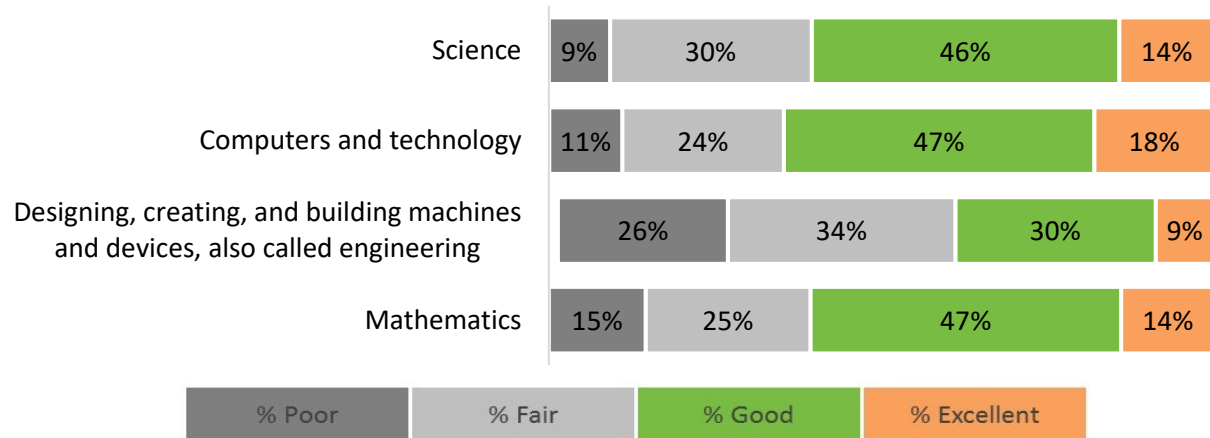


Figure 30. How well do you think the schools in your community are teaching each of the following subjects?



## Appendix A: Statewide student interest inventory

Statewide standardized tests are taken annually by nearly every student in 3<sup>rd</sup> through 11<sup>th</sup> grade in the state of Iowa. The Iowa Assessments were administered from FY13 through FY18, and the Iowa Statewide Assessment of Student Progress were administered beginning in FY19. Since 2012-2013, an 8-item interest inventory has been added to the Iowa Assessments. In January 2016, an additional item was added at the request of the Council. Schools have the option to administer the inventory to their students. The Interest Inventory was developed in part to serve as a data source for both the Iowa STEM indicators and as a way to compare students who participate in the STEM Scale-Up Program with all students statewide.

Two versions of the inventory were created with variations in question wording and response options to accommodate different grade levels. Response options for students in 3<sup>rd</sup> through 5<sup>th</sup> grade were “I like it a lot,” “It’s okay,” or “I don’t like it very much” for items one to seven, and “I would like it a lot,” “It would be okay,” or “I would not like it very much” for items eight and nine, respectively. Response options for grades 6<sup>th</sup> through 11<sup>th</sup> were “Very interested,” “Somewhat interested,” or “Not very interested” for all items.

Table. Statewide Student Interest Inventory

Grades 3 <sup>rd</sup> -5 <sup>th</sup>	Grades 6 <sup>th</sup> -11 <sup>th</sup>
1. How much do you like to create and build things?	1. How interested are you in designing, creating, and building machines and devices (also called engineering)?
2. How much do you like math?	2. How interested are you in math?
3. How much do you like science?	3. How interested are you in science?
4. How much do you like art?	4. How interested are you in art?
5. How much do you like reading?	5. How interested are you in English and language arts?
6. How much do you like using computers and technology?	6. How interested are you in computers and technology?
7. How much do you like social studies?	7. How interested are you in social studies (such as history, American studies, or government)?
8. When you grow up, how much would you like to have a job where you use science, computers, or math?	8. As an adult, how interested would you be in having a job that uses skills in science, technology, math, or engineering?
9. When you grow up, how much would you like to have a job in Iowa?	9. How interested are you in living in Iowa after you graduate and go to work?

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