Iowa STEM Monitoring Project

2015-2016 Summary Report

Presented at the

Governor's STEM Advisory Council Meeting XVI

September 28, 2016

Ankeny, IA

Iowa STEM Monitoring Project

Objective: Systematically observe a series of defined metrics and sources to examine changes regarding STEM education and economic development in Iowa centered on the activities of the Iowa Governor's STEM Advisory Council.

Iowa STEM Indicators

System to track publicly available data at the state, regional, and national level

18 indicators in 4 areas:

1. K-12 STEM interest and achievement
2. K-12 student preparation
3. College completions
4. Employment

Data sources:

- Department of Education
- Iowa colleges and universities
- Census Bureau
- Iowa Workforce Development
- Iowa Testing Programs
- National Assessment of Educational Progress
- ACT

Statewide Survey of Public Attitudes Toward STEM

Annual survey of adult Iowans regarding attitudes toward and awareness of STEM education and economic development

Additional questions target perceptions of parents of K-12 children

Data collected from 2,000+ Iowans; results adjusted to reflect opinions of statewide population

Used as an indicator of STEM attitudes and awareness among the general population

Statewide Student Interest Inventory

Annual assessment of interest and achievement in STEM among Iowa's K-12 students on the Iowa Assessments

8 questions gauge interest across individual STEM topics and careers

Assessment of achievement scores and national percentile rank in math and science

Student interest and achievement compared across demographic and geographic lines

Scale-Up/ Regional

Program level perspective on STEM Scale-Up programs

Scale-Up programs implemented in schools and organizations across Iowa's 6 STEM regions

Teacher survey about Scale-Up implementation

Student survey about interest in STEM after participating in a Scale-Up program

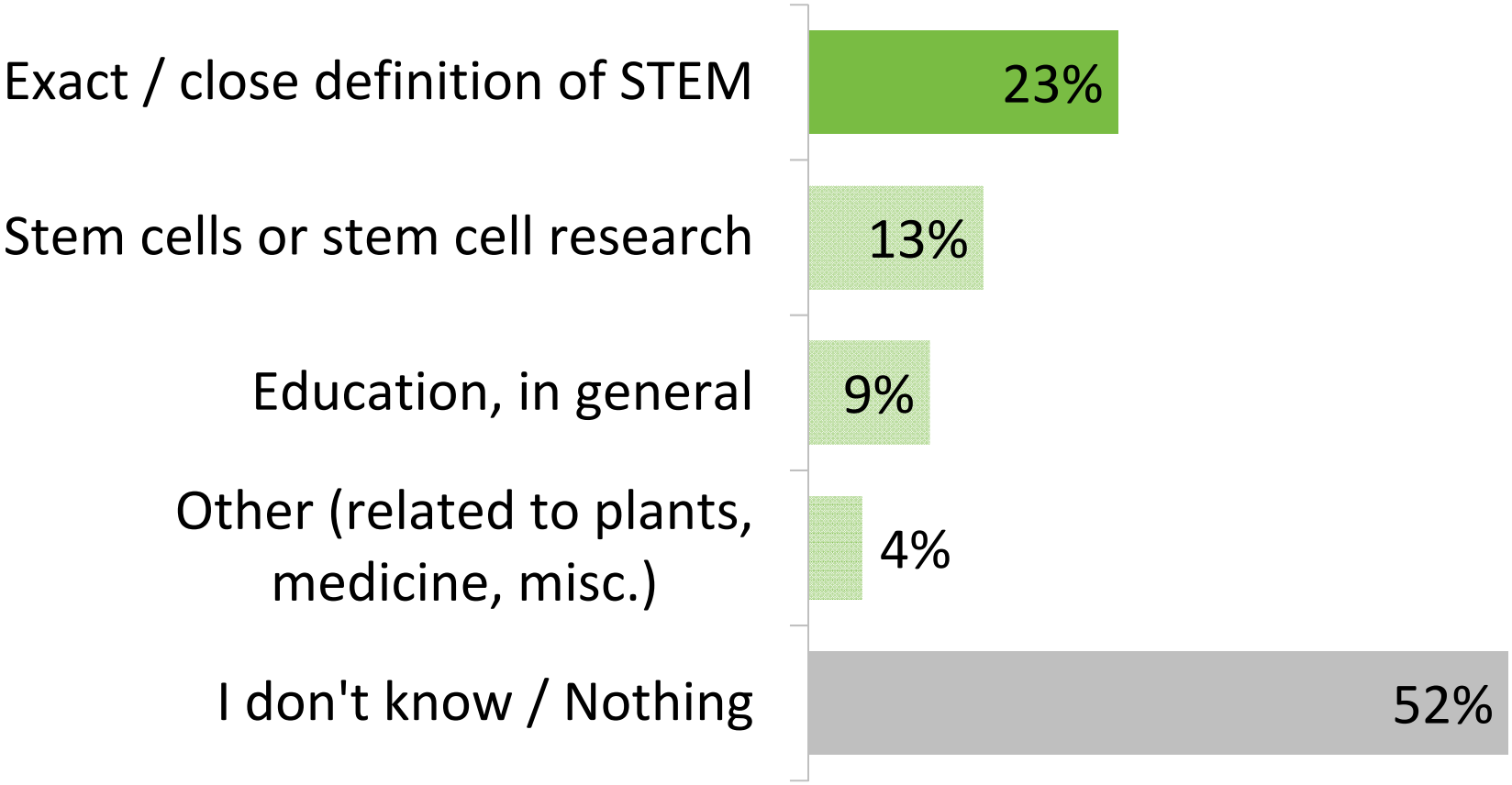
Comparison of Scale-Up student participants versus all students statewide on math and science scores on the Iowa Assessments

SURVEY OF PUBLIC ATTITUDES TOWARD STEM

This research was funded in part by the Iowa Governor's STEM Advisory council and the National Science Foundation (Award No. DRL-1238211). The opinions, findings, and conclusions expressed in this presentation are those of the authors and not necessarily those of the Governor of Iowa, the Iowa Governor's STEM Advisory Council, the University of Northern Iowa, or the National Science Foundation.

UNCUED RECALL AND UNDERSTANDING OF STEM, 2015

Approximately one in four Iowans could describe an exact or close definition of STEM



Question: You may have heard about STEM education or STEM careers lately. What, if anything, comes to mind when you hear the letters S-T-E-M, or the word STEM?
Source: 2015 Statewide Survey of Adult Iowans Toward STEM, Iowa STEM Monitoring Project, August 2016

CUED RECALL AND UNDERSTANDING OF STEM, 2015

When asked an uncued, open-ended question about the acronym STEM, about one in four respondents could describe an exact or close definition of STEM; however, 51% of Iowans said they had seen, read, or heard about STEM when it was defined for them.

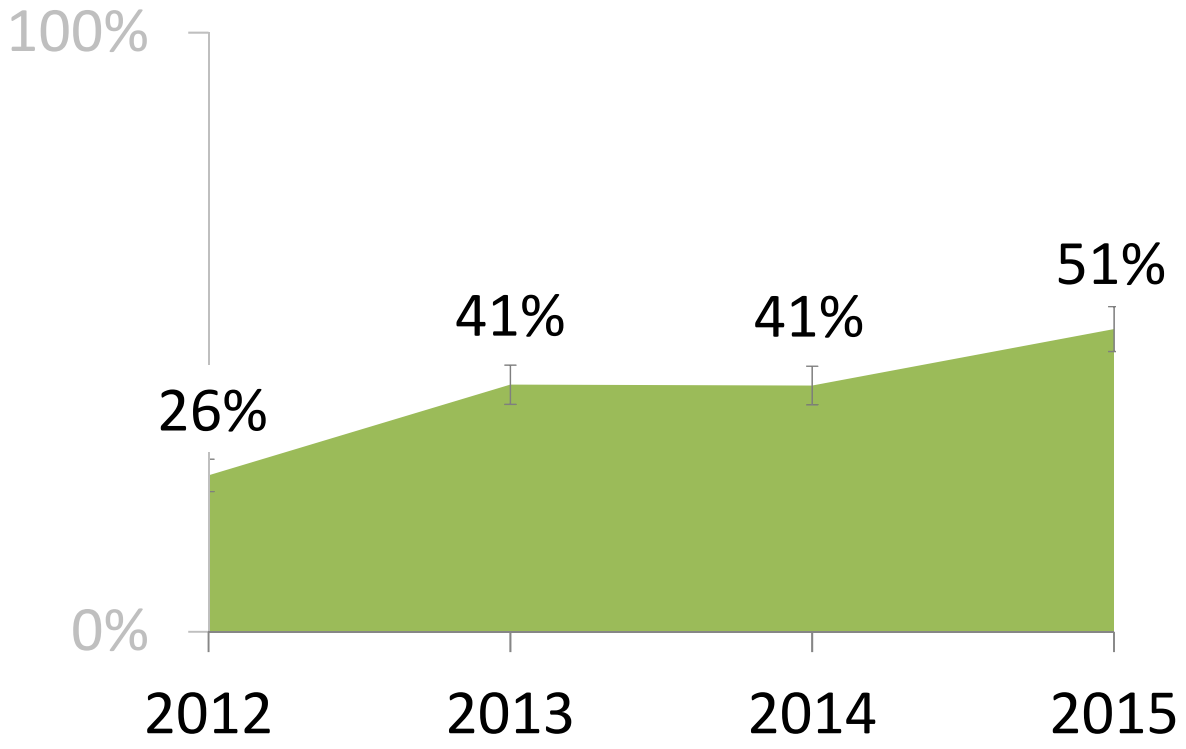
51%

of Iowans have heard of STEM

Question: STEM stands for 'science, technology, engineering, and mathematics.' Have you read, seen, or heard of this before? (% Yes)
Source: 2015 Statewide Survey of Adult Iowans Toward STEM, Iowa STEM Monitoring Project, August 2016

INCREASE IN STEM AWARENESS AMONG IOWANS FROM 2012 TO 2015

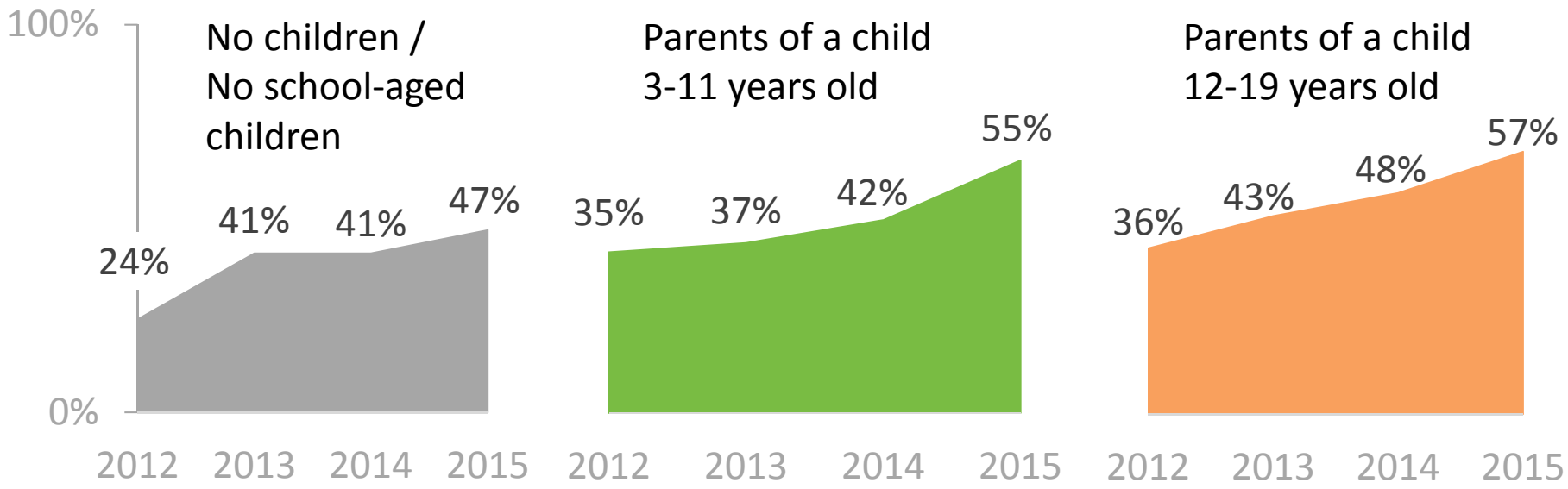
Iowans who have read, seen, or heard about STEM has nearly doubled since 2012, from 26% in the first year of the survey to 51% in 2015.



Question: STEM stands for 'science, technology, engineering, and mathematics.' Have you read, seen, or heard of this before? (% Yes)
Source: 2015 Statewide Survey of Adult Iowans Toward STEM, Iowa STEM Monitoring Project, August 2016

INCREASE IN STEM AWARENESS AMONG PARENTS FROM 2012 TO 2015

From 2012 to 2015, awareness of STEM increased from 35% to 55% among parents of a child 3 to 11 years old, and from 36% to 57% among parents of a child 12 to 19 years old.



Question: STEM stands for 'science, technology, engineering, and mathematics.' Have you read, seen, or heard of this before? (% Yes)
Source: 2015 Statewide Survey of Adult Iowans Toward STEM, Iowa STEM Monitoring Project, August 2016

Support for Prioritizing STEM education 2015

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

46%

(22% said they didn't know)

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

94%

No difference by gender, education, parent status, or place of residence

Question: Do you think STEM education **is a priority** in your local school district? (%Yes/No/Don't know) (Updated Spring 2016)
Do you think STEM education **should be a priority** in your local school district? (%Yes/No)
Source: 2015 Statewide Survey of Adult Iowans Toward STEM, Iowa STEM Monitoring Project, August 2016

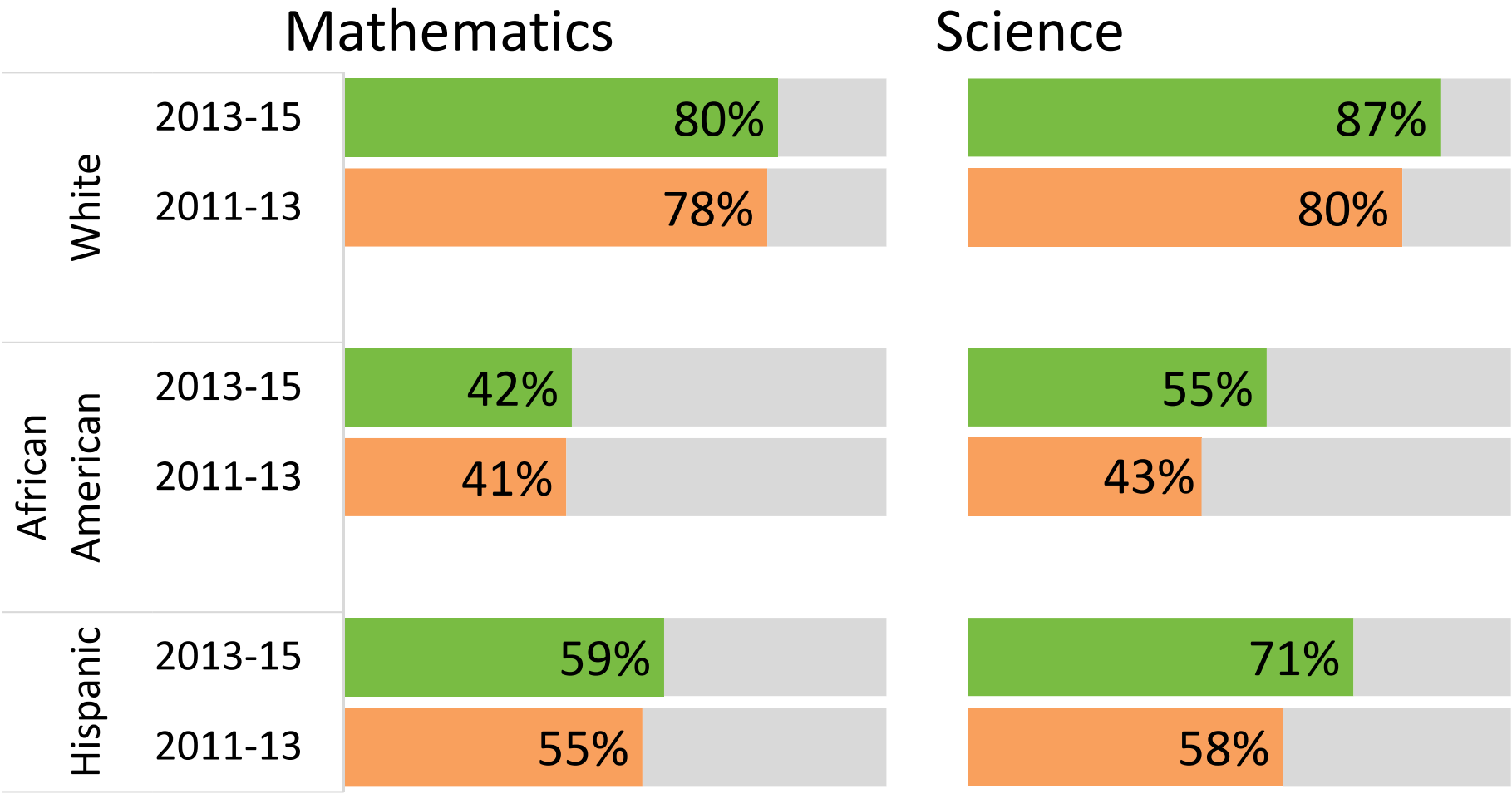
IOWA STEM INDICATORS

Iowa STEM Indicators: STEM Achievement

Indicator	Math Achievement		Science Achievement	
Iowa Testing Programs (since 2011-2013)	Increase % proficient in 4th (+2%) 8th (+2%) and 11th (+2%) grade students	4th/ 8th 11th	Increase +8% proficient in 8th grade; decrease -5% proficient in 11th grade	8th 11th
National Assessment of Educational Progress (since 2011)	Increase % proficient in 4th (+1%) 8th (+3%) Grade students	4th/ 8th	Science assessment data from 2015 not yet available	
ACT (since 2011)	Decrease from 52% to 48% of students meeting benchmarks		Increase from 40% to 48% of students meeting benchmarks	

Iowa STEM Indicators:

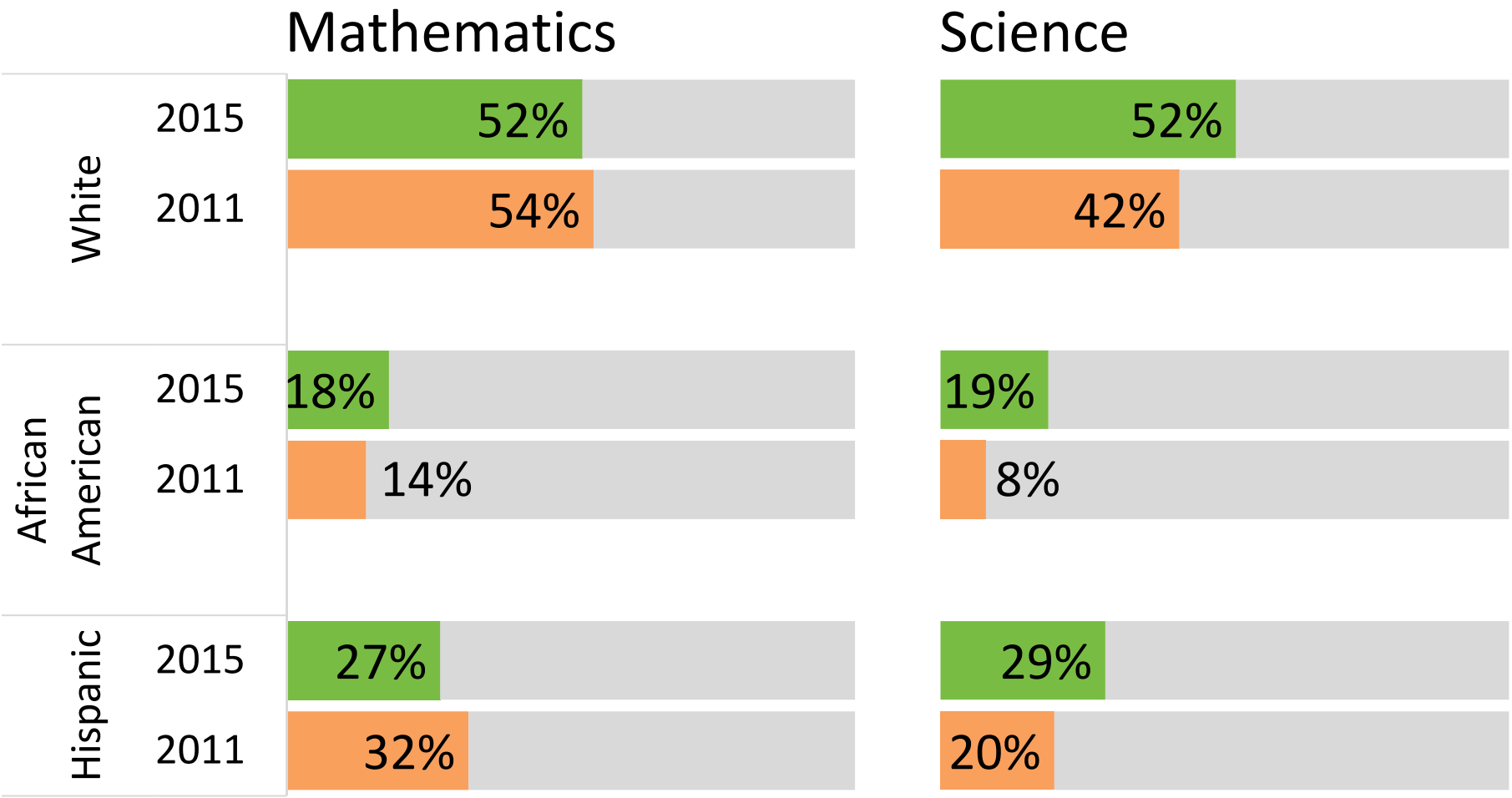
Proportion of Iowa students in the 8th grade who are proficient in mathematics and science on the Iowa Assessments by race/ethnicity



Data source: Iowa Assessments, Iowa Testing Programs
Iowa STEM Monitoring Project, August 2016

Iowa STEM Indicators:

Iowa graduating seniors meeting college readiness benchmarks in mathematics and science based on ACT scores by race/ethnicity



Data source: ACT, Inc.
Iowa STEM Monitoring Project, August 2016

Iowa STEM Indicators: STEM Preparation

Indicator	Trend	% Change
Teacher Licensure	From 2011/12 to 2015/2016, increase in number of high school teachers with *initial* teacher licensure, decrease *standard* teacher licensure, and decrease in *master-educator* licensure in in STEM-subject areas.	Initial 28% Standard -20% Master educator -2%
Teacher Retention	In 2014/15, there were 85 new teachers hired to teach advanced high school STEM-related courses. One year later, their retention rate was 80% - the highest retention rate since tracking began. In 2010/11, there were 73 new teachers hired to teach advanced high school STEM subject courses. Five years later, 33% of those teachers were still teaching advanced high school STEM-subject courses.	1-Yr Retention 80% 4-Yr Retention 33%
HS Student Enrollment in STEM	From 2011/12 to 2015/16, increased student enrollment in science, decreased enrollment in technology, and increased enrollment engineering and math	Science 4% Technology -9% Engineering 8% Math 14%

Data source: Iowa Department of Education, Bureau of Information and Analysis Services, Basic Education Data Survey (BEDS), 2016

Iowa STEM Indicators: College Completions

Indicator	Trend	% Change
Community College	Since 2011/12, the total number of awards granted by community colleges in STEM-related fields increased by 3%	3%
4-year Public	Since 2011/12, the total number of awards granted by Iowa's 4-year public universities in STEM-related fields increased by 13%	13%
4-year Private, not-for-profit	Since 2011/12, the total number of awards granted by Iowa's 4-year private, not-for-profit colleges in STEM-related fields increased by 8%	8%
4-year Private, for-profit	Since 2011/12, the total number of awards granted by Iowa's 4-year private, for-profit colleges in STEM-related fields decreased by 27%	5%

Data source: Integrated Postsecondary Education Data System (IPEDS), National Center for Education Statistics
Iowa STEM Monitoring Project, August 2016

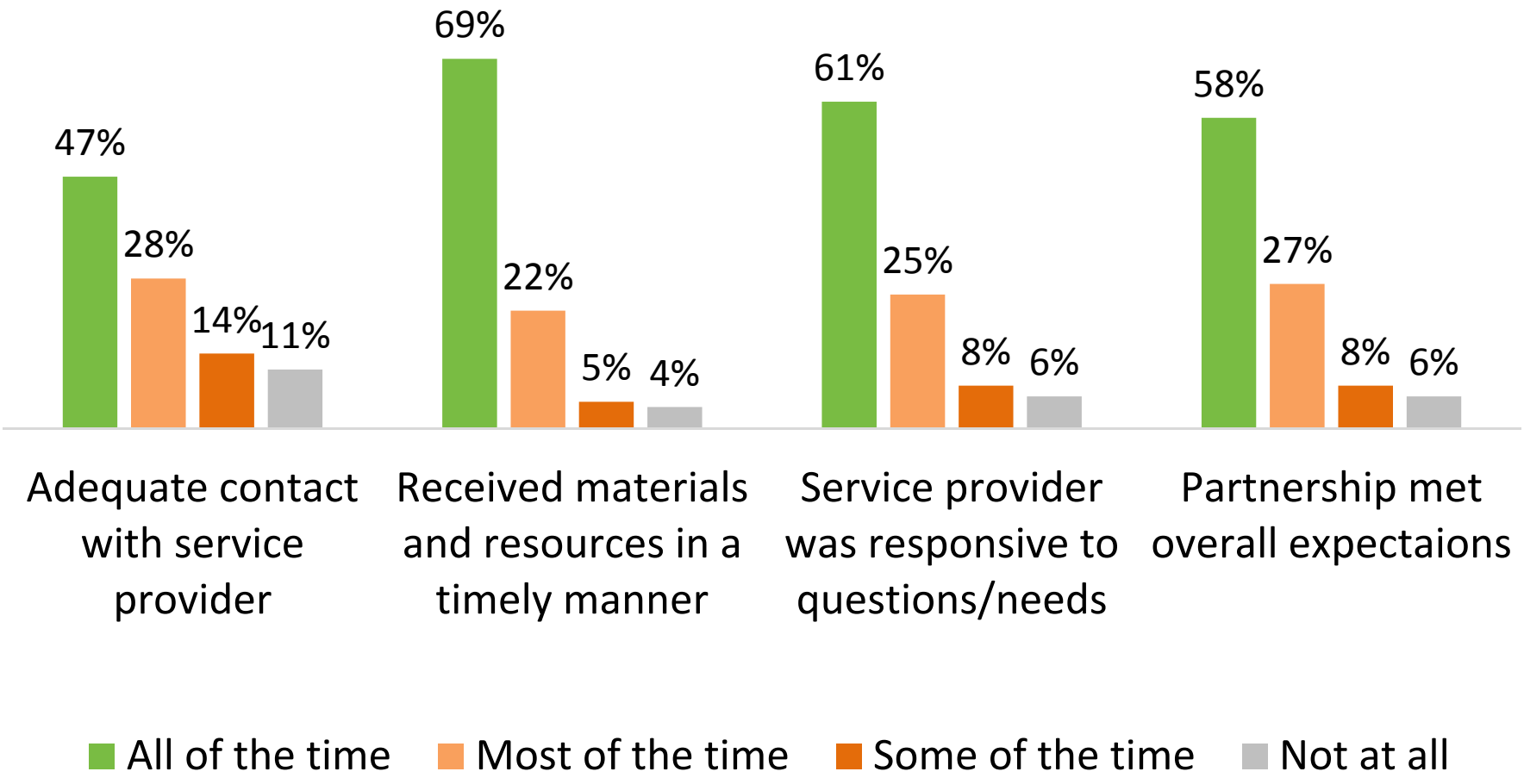
REGIONAL SCALE-UP PROGRAM MONITORING

Regional Scale-Up Programs Educator Survey

- 73% of educators implemented their Scale-Up Program as intended; 20% made minor changes, and 4% made major changes
- Reasons for modifications
  - Adjusting lessons to fit the grade level
  - Adapting program to an informal learning setting such as a library, after-school program, or summer program
  - Shortening or cutting lessons due to time constraints in the classroom

Data source: 2015/16 Educator Survey, Research Institute for Studies in Education (ISU)
Iowa STEM Monitoring Project, August 2016

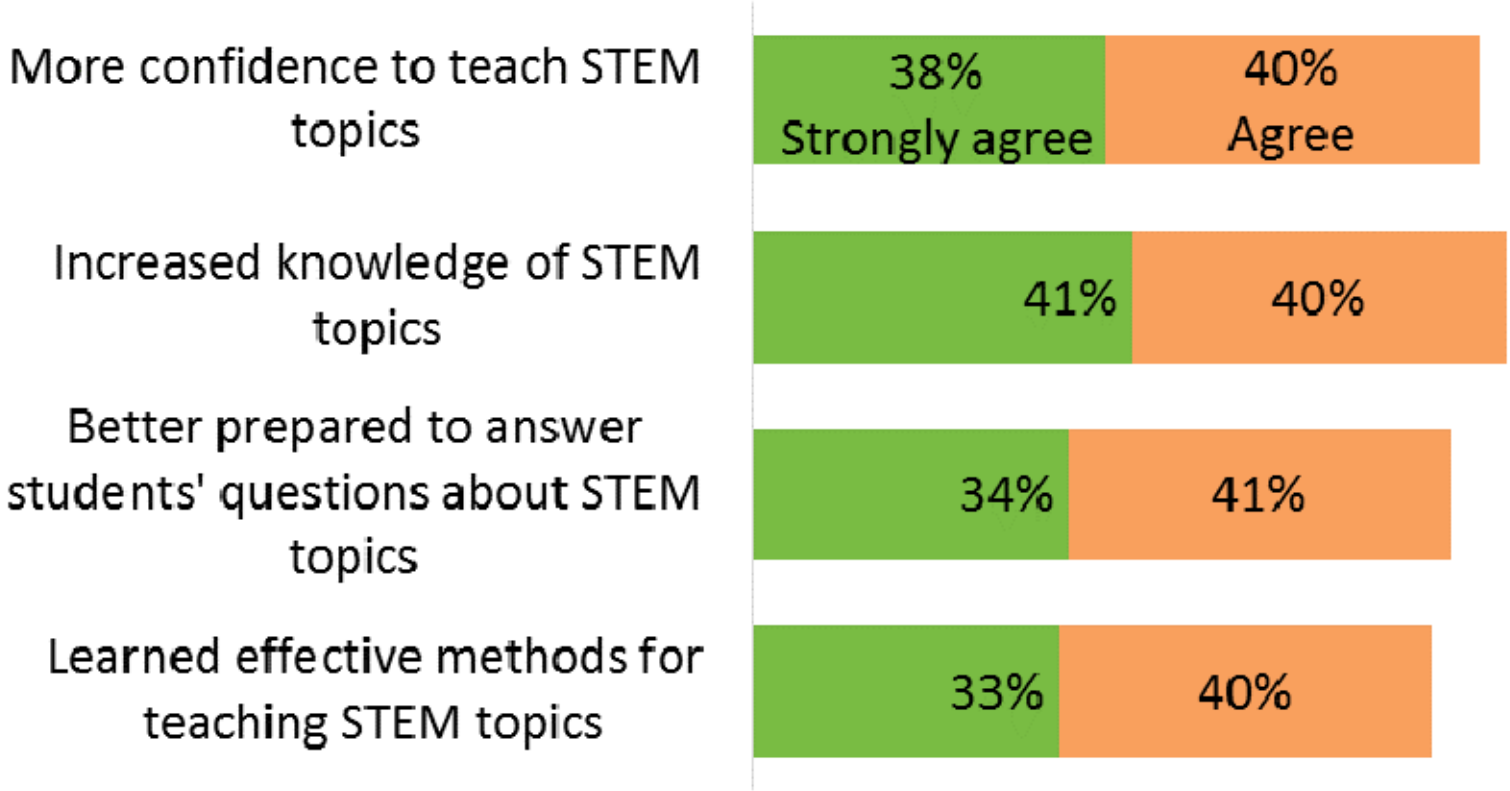
Educator experiences with service providers



Data source: 2015/16 Educator Survey, Research Institute for Studies in Education (ISU)
Iowa STEM Monitoring Project, August 2016

Regional Scale-Up Programs Educator Survey

Educators who implemented a Scale-Up Program reported increased knowledge, skills, and confidence to teach STEM.



Data source: 2015/16 Educator Survey, Research Institute for Studies in Education (ISU)
Iowa STEM Monitoring Project, August 2016

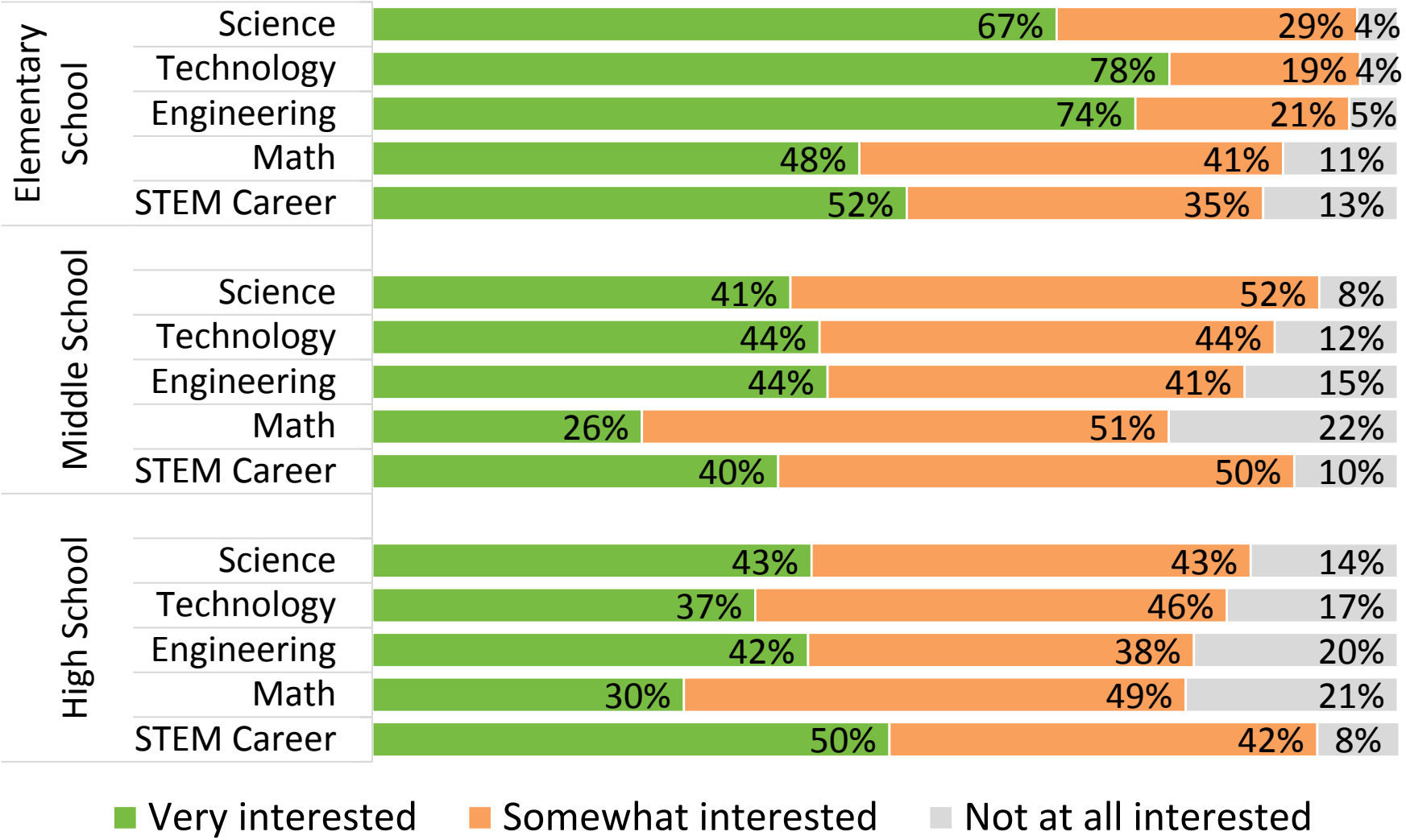
Regional Scale-Up Programs Educator Survey

Educators reported working with an estimated 873 school-business partnerships, including 287 new school-business partnerships established as a result of 2015/16 STEM Scale-Up Programming.

- *Our students volunteered throughout the year with this organization and their model for starting plants was adopted in our own building to provide plants for our own garden planting as well as to run a plant sale to generate funds for future sustainable ag projects.*
- *I did the water filter unit and the local water plant allowed us to tour and shared some testing materials with us.*
- *I was able to work with them to get an engineer and a trainer to visit my classroom to give feedback to students on their designs….I felt it was extremely important for the students to hear about how they got their jobs and what they actually do.*

Data source: 2015/16 Educator Survey, Research Institute for Studies in Education (ISU)
Iowa STEM Monitoring Project, August 2016

Regional Scale-Up Programs: Student Survey

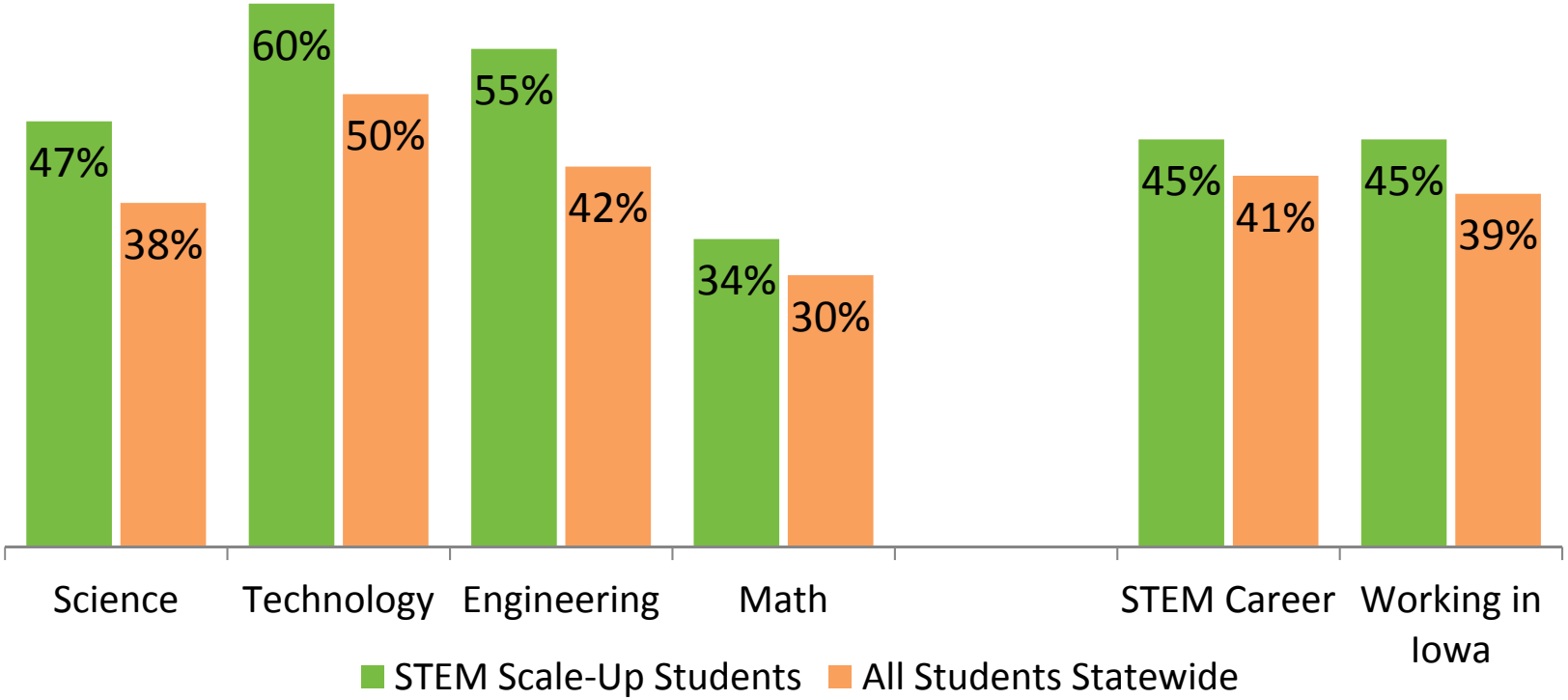


Question(s): How interested are you in…math? computers and technology? designing, creating, and building machines and devices (also called engineering)? science? having a job that uses skills in science, technology, math, or engineering?

Data source: 2015/16 Student Survey; Center for Social & Behavioral Research (UNI)

Regional Scale-Up Programs Student Participation

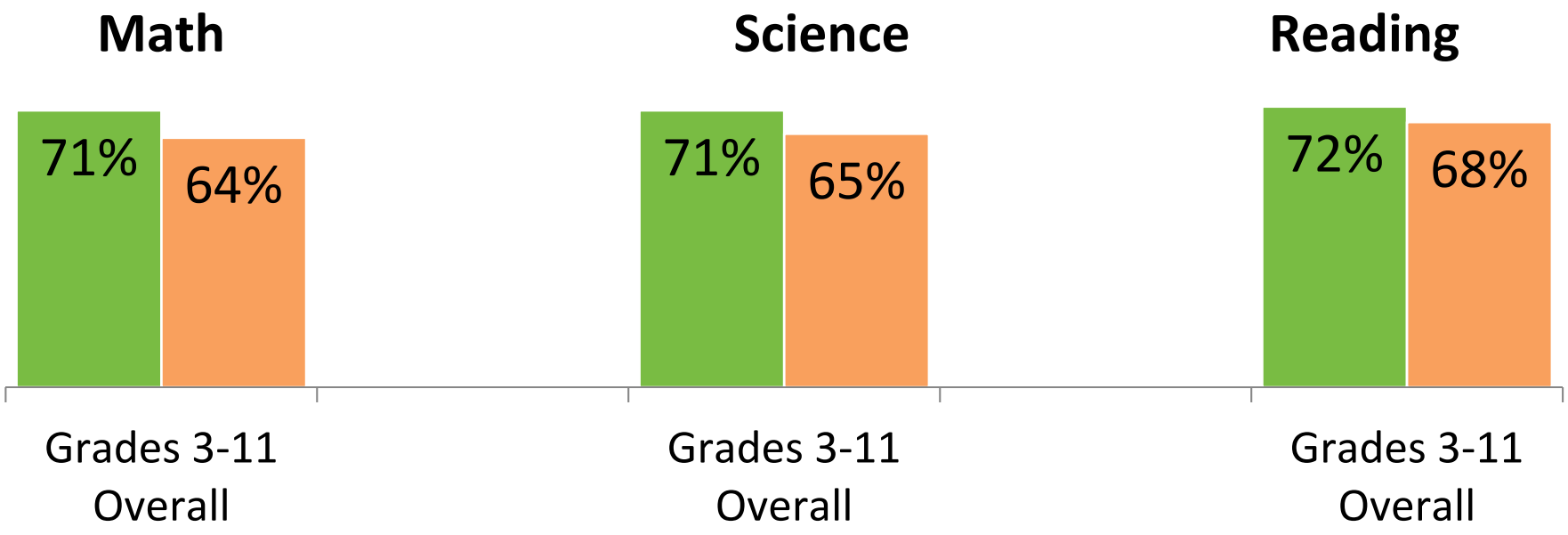
A higher percentage of students who participate in STEM Scale-Up programs said I like it a lot (Grades 3-5) or were very interested (Grades 6-12) in STEM subjects, pursuing a STEM career, and working in Iowa someday compared to all students statewide



Data source: 2015/16 Iowa Assessments, Iowa Testing Programs (UI)
Iowa STEM Monitoring Project, August 2016

Math, Science, and Reading Achievement on The Iowa Assessments

In 2015/16, students across all grade groups who participated in STEM Scale-Up programs had higher average National Percentile Rank of math, science, and reading scores on the Iowa Assessments compared to all students statewide.



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