

GREATNESS
STEMS
FROM IOWANS

Iowa STEM Monitoring Project

2013-2014 Summary Report

Presented at the
Governor's STEM Advisory Council Meeting IX
September 12, 2014
Iowa City, 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 (ISIS)

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

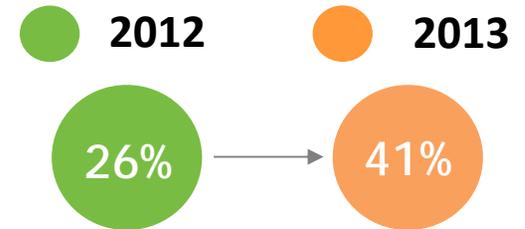


Statewide Survey of Public Attitudes Toward STEM 2012(Y1) and 2013 (Y2)

Increased Awareness & Support for STEM

Increased awareness

From 2012 to 2013, awareness of STEM has significantly increased



In addition, significantly more lowans *strongly agree* that...

Increased support for STEM's economic contributions

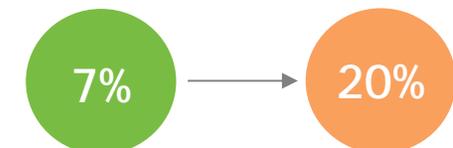
Increased focus on STEM education in Iowa will improve the state economy



More should be done to increase the number of women working in STEM jobs



More should be done to increase the number of Hispanics and African Americans working in STEM jobs



Advancements in science, technology, engineering, and math will give more opportunities to the next generation



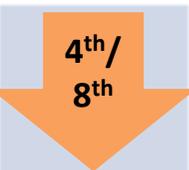
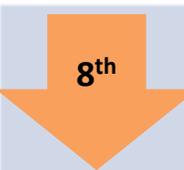
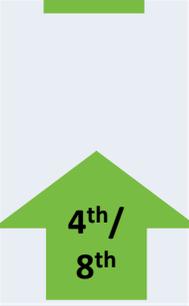
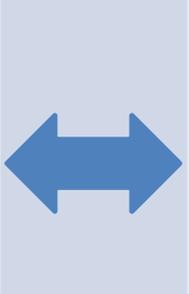
Increased support for broadening participation



IOWA STEM INDICATORS SYSTEM



Iowa STEM Indicators System: STEM Achievement

Indicator	Math Achievement (since 2009)		Science Achievement (since 2009)	
Iowa Testing Programs	Decrease % proficient in 4 th & 8 th grade; increase % proficient in 11 th grade (since 2009)	 	Decrease % proficient in 8 th grade; increase % proficient in 11 th grade	 
National Assessment of Educational Progress	Increase % proficient in 4 th & 8 th grade		Not reported	
ACT	No change in % meeting benchmarks		Increase in % meeting benchmarks	



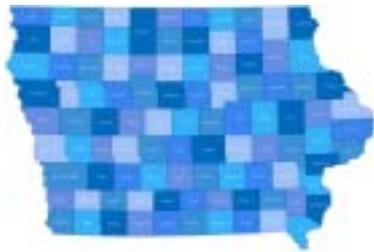
Iowa STEM Indicators System: STEM Preparation

Indicator	Trend	Change
Teacher Licensure	From Year 1 (2012/13) to Year 2 (2013/14), decrease in number of high school teachers with <i>initial & standard</i> teacher licensure in STEM-subject areas, but increase in <i>master-educator</i> licensure in science, math, and engineering subjects	Initial / Standard -18% / -13% Master educator 5%
Teacher Endorsement	From Year 1 (2012/13) to Year 2 (2013/14), increase in the number of teachers who held at least one endorsement in the area of science or math	Math 13% Science 13%
Teacher Retention	About one-half of teachers hired to teach advanced HS STEM-subject courses 4 years ago were still teaching in 2013-2014	
HS Student Enrollment in STEM	From Year 1 (2012/13) to Year 2 (2013/14), no change in student enrollment in science, decreased enrollment in technology, and increased enrollment engineering and math	Science ↔ Technology -10% Engineering 13% Math 3%



Iowa STEM Indicators System: College Completions

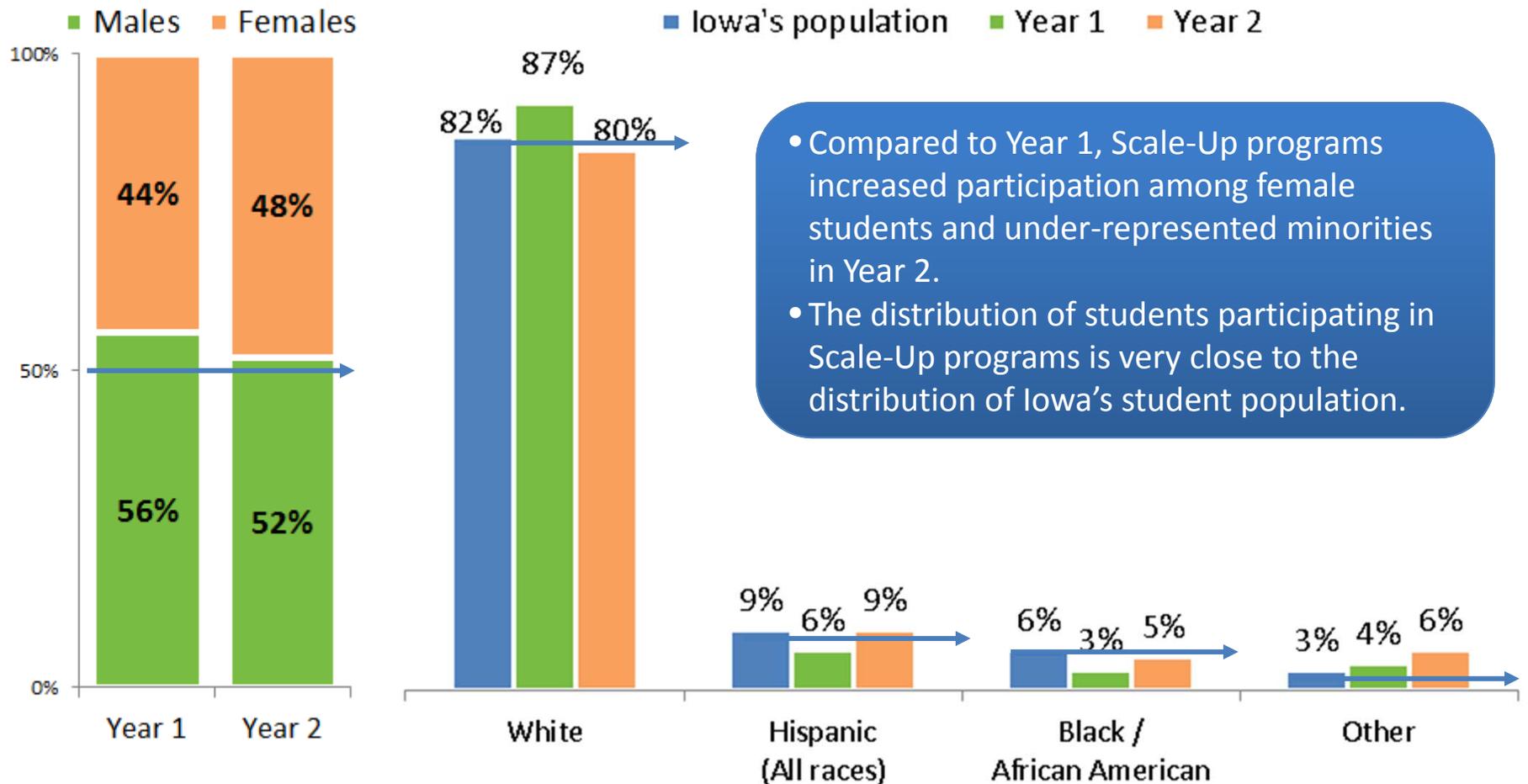
Indicator	Trend	Change
Community College	Since 2009, the total number of awards granted by community colleges in STEM-related fields increased by 10%	 10%
4-year College or University	Since 2010, the total number of awards granted by 4-year colleges and universities in STEM-related fields increased by 43%	 43%



REGIONAL SCALE-UP PROGRAM MONITORING



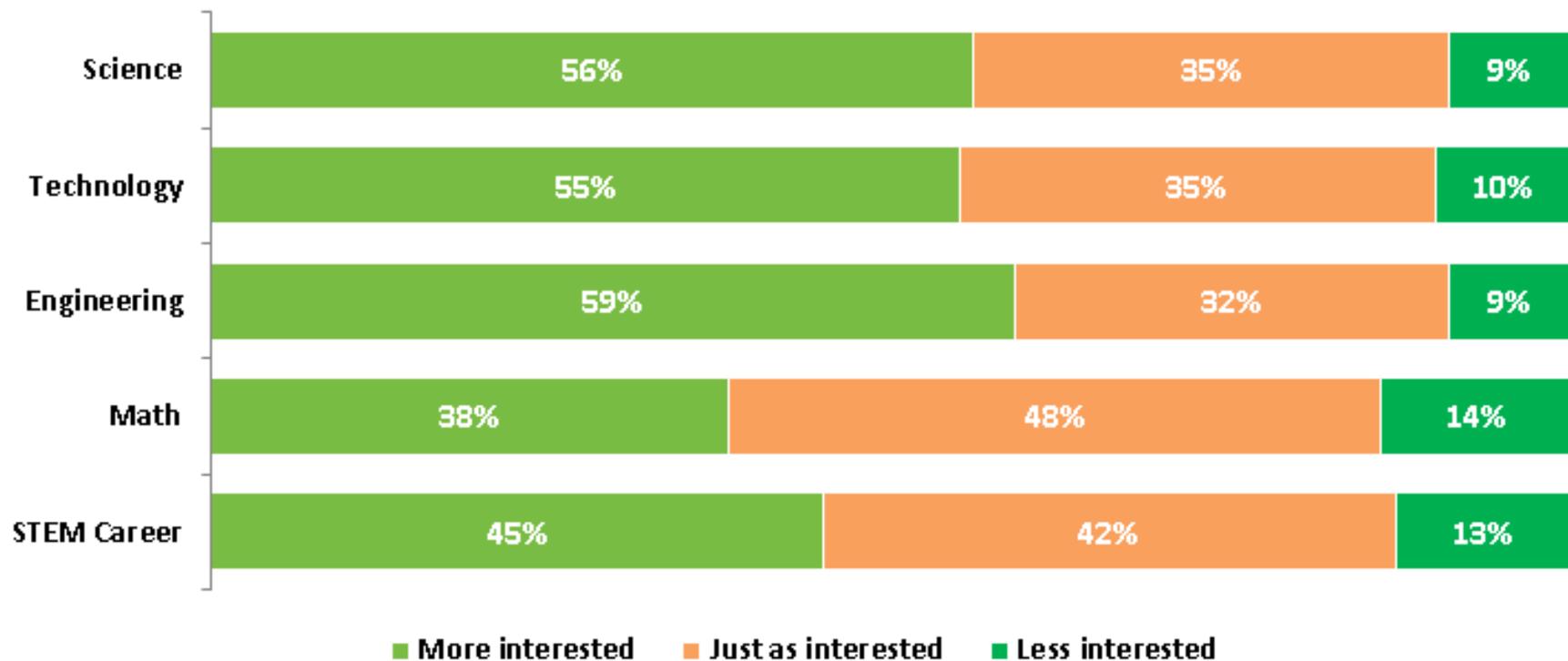
Regional Scale-Up Programs Student Participation





Regional Scale-Up Programs Student Survey

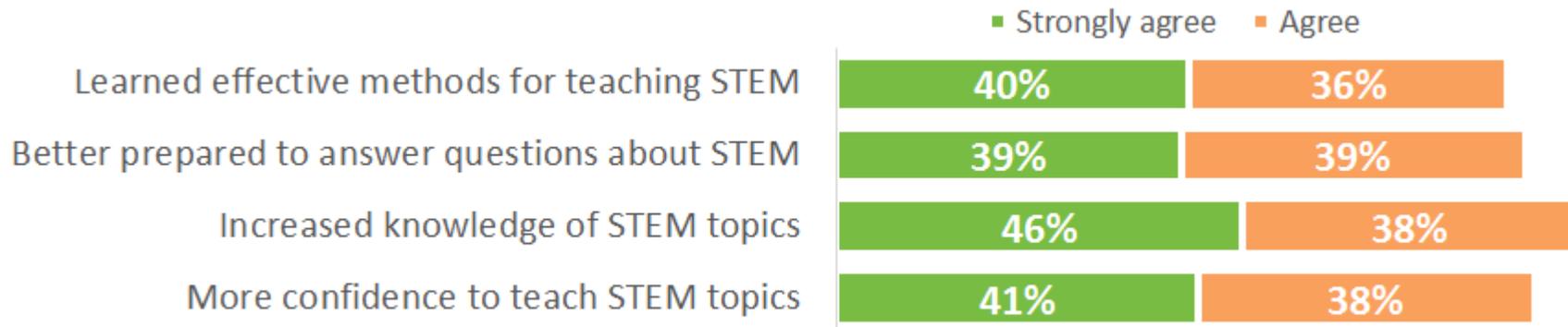
- Majority of students reported increased interest in STEM topics and careers following participation in a Scale-Up Program.





Regional Scale-Up Programs Teacher/leader Survey

- Teachers & leaders who implemented a Scale-Up Program reported increased knowledge, skills, and confidence to teach STEM



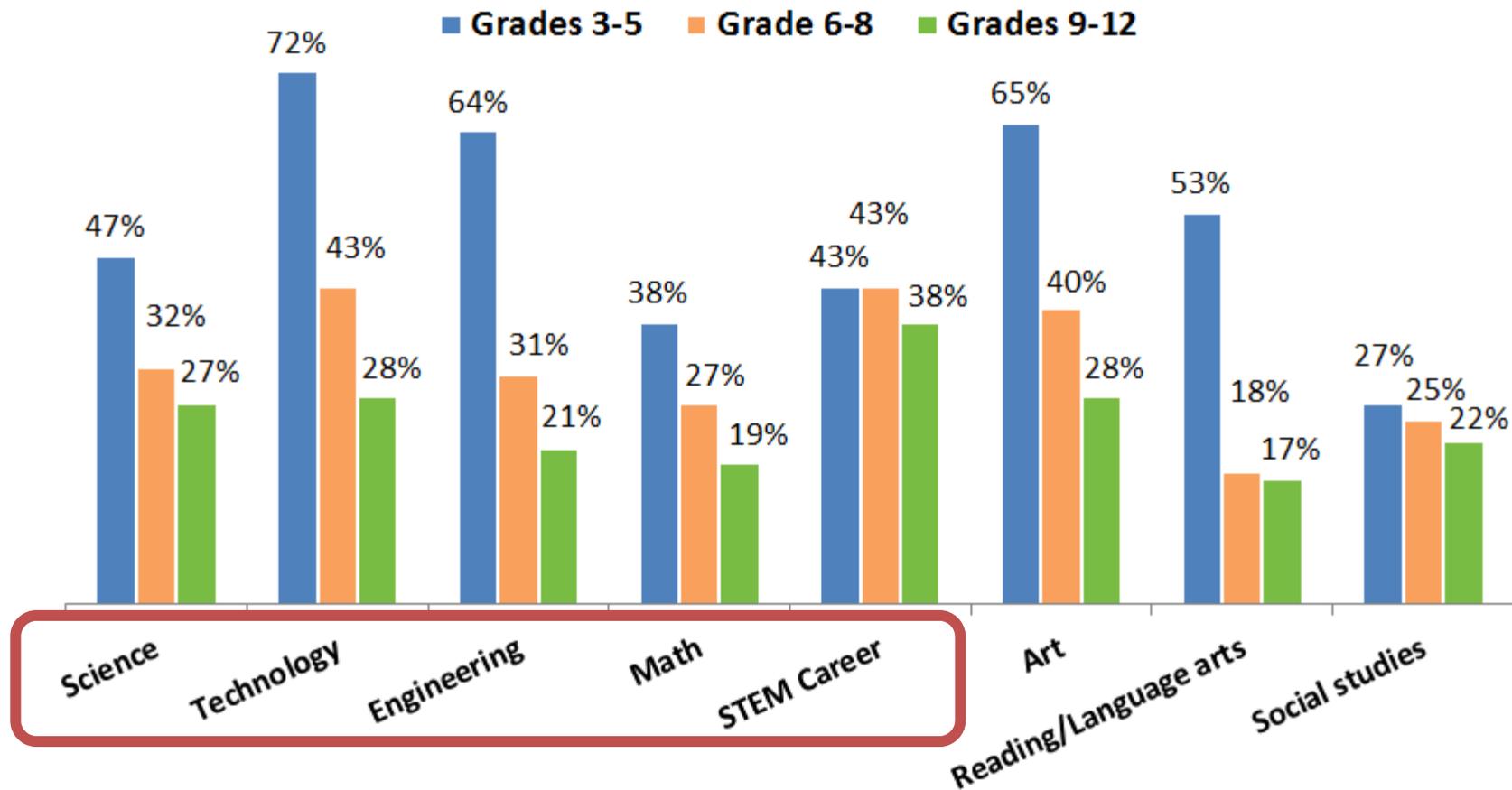
- School-business partnerships enhanced some Scale-Up programs by providing guest speakers, industry-based volunteer mentors, and field trips
- Observed impacts
 - “my students now connect many of our day-to-day lessons to STEM”
 - “students are becoming more and more confident doing STEM activities”
 - “[Students] were very engaged and tackled the challenges that went with learning how to use programming language”



STATEWIDE STUDENT INTEREST INVENTORY



Percent of students statewide by grade group who said they “like it a lot” (Grades 3-5) or were “very interested” (Grades 6-12) in seven subject areas or a STEM career (2013/14)



More elementary students are “very interested” in individual STEM topics compared to junior high or high school students. However, interest in STEM careers is similar across grade groups with about 40% of all students “very interested” in pursuing a STEM career.



Iowa STEM Monitoring Project: Impacts

- Indicators are showing both gains and losses

→ More work to do!

- Impacts are in line with goals and priorities set by the Council
 - Increase awareness, interest, and achievement
- Decreasing the gap in participation in STEM among female students and underrepresented minorities



Iowa STEM Monitoring Project: Possible implications

- Iowa STEM Council
 - Can the findings of the public awareness survey be used to inform the public awareness campaign?
 - What more can be done to target:
 - Difference between male versus female students?
 - Maintaining/increasing interest in STEM through the grade levels?
- Iowa STEM Monitoring Project
 - Continue to follow indicators
 - What is missing?
 - Are there better measures?