

IMPROVING STEM EDUCATION IN GEORGIA'S COLLEGES AND UNIVERSITIES

INSIGHTS FROM FIVE YEARS OF EVALUATION

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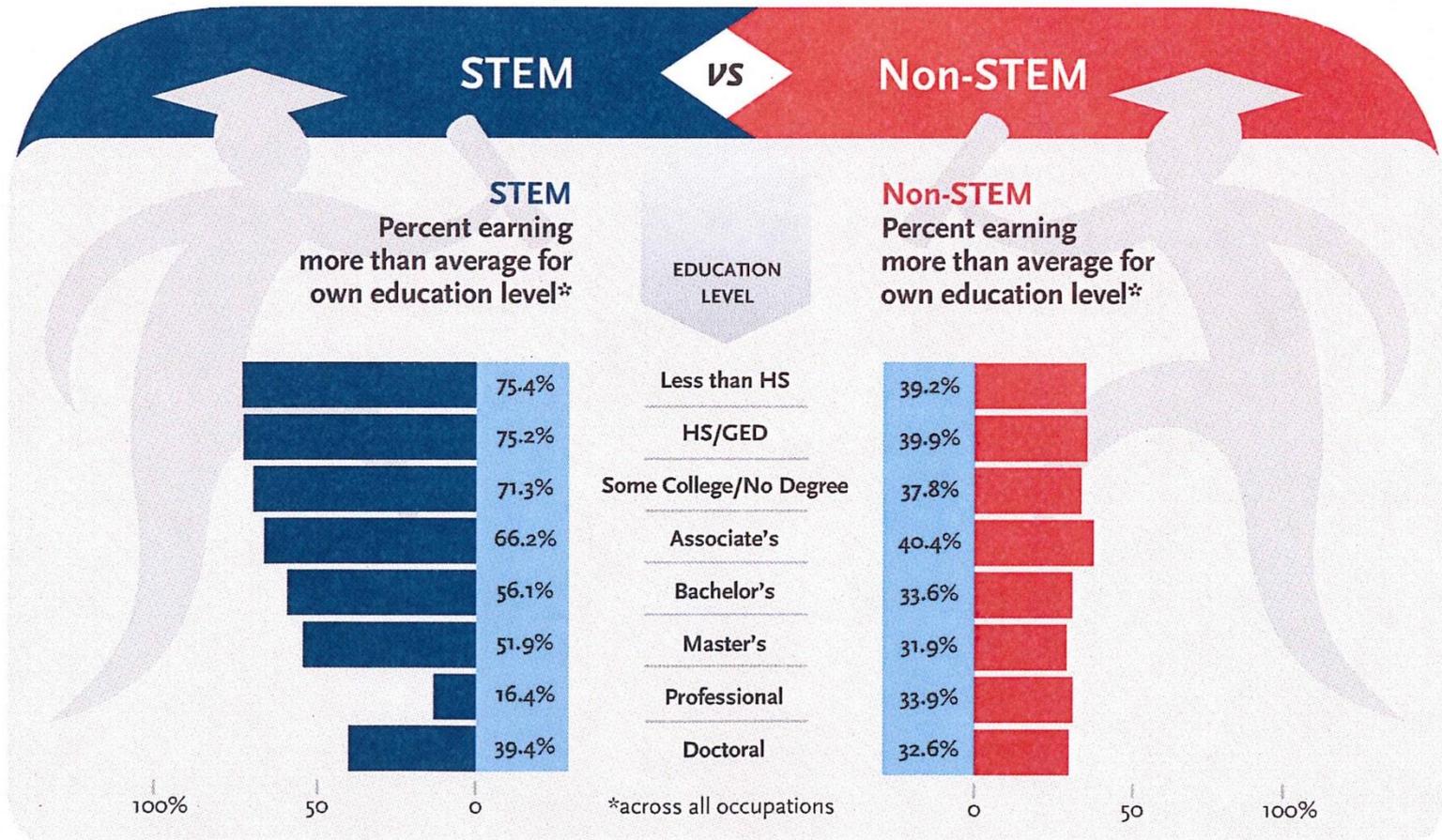
UNDERSTANDING THE CHALLENGE

The need to increase student access and success within STEM in Georgia's colleges and universities.

STEM Challenges for Georgia

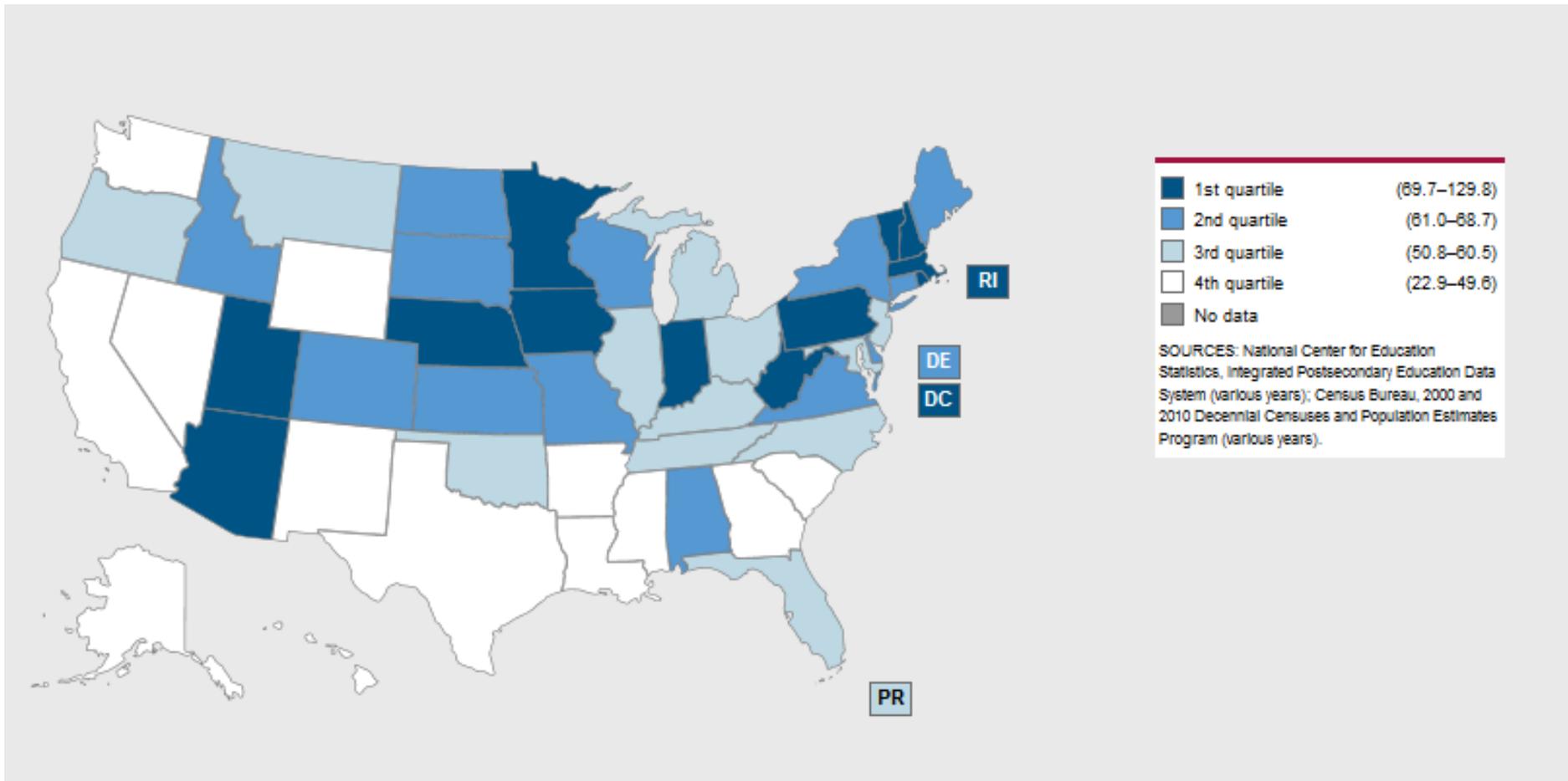
- National Competitiveness in STEM
 - 2012 PCAST report *Engage to Excel*: 1 million more STEM graduates in the next decade to maintain U.S. leadership
 - Less than 40% of all undergraduate students who intend to major in STEM fields actually receive STEM degrees.
- STEM Workforce Opportunities
 - STEM workers report higher earnings than in other fields
 - 8 of top 10 undergraduate majors with highest median salaries in engineering.
 - Other 2 in pharmaceutical sciences and math and computer sciences
 - Georgetown study: 17% STEM job growth vs. 10% non-STEM job growth through 2018

STEM Opportunities

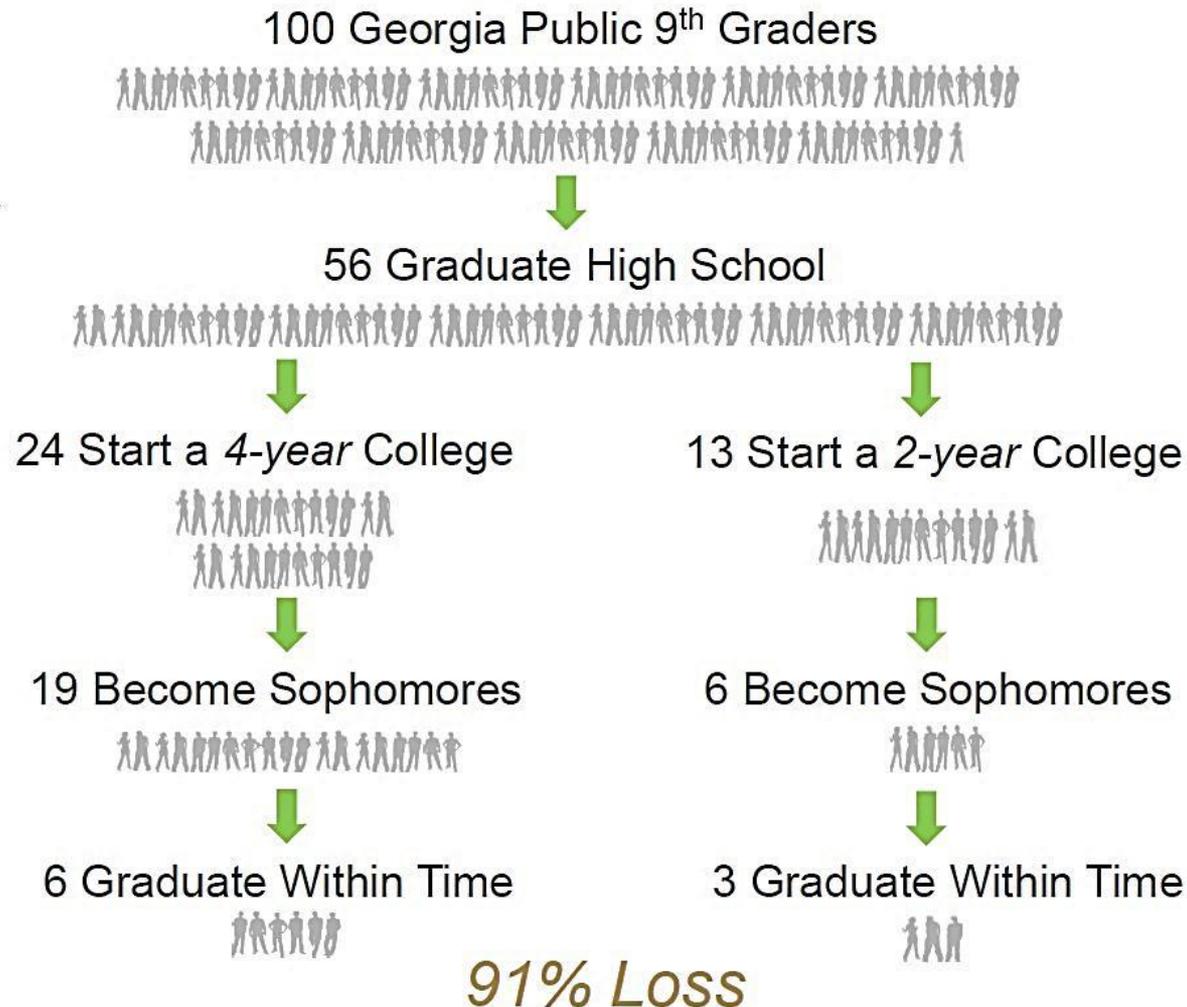


¹⁹ For those with a terminal Bachelor's degree working full-time, full-year.

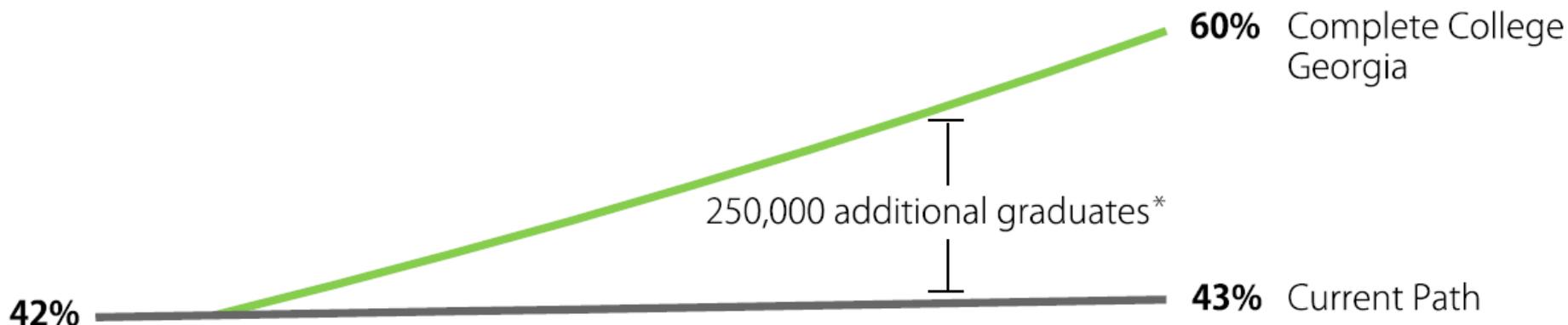
How Does Georgia Compare?



Challenge of Attainment in Georgia



Complete College Georgia

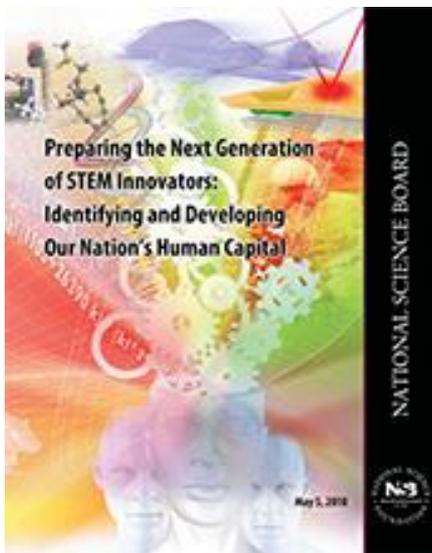


*Projected need, assuming current graduation levels are maintained, and population change is met.

Key Focuses for Improving Postsecondary Attainment

- **College Readiness**
- **Improve Access and Completion for Underserved Students**
- Shortening Time to Degree
- **Restructuring Instructional Delivery**
- **Transforming Remediation**

Broadening Participation in STEM



“The nation's economic prosperity, security, and quality of life depends on the identification and development of our next generation of STEM innovators.”

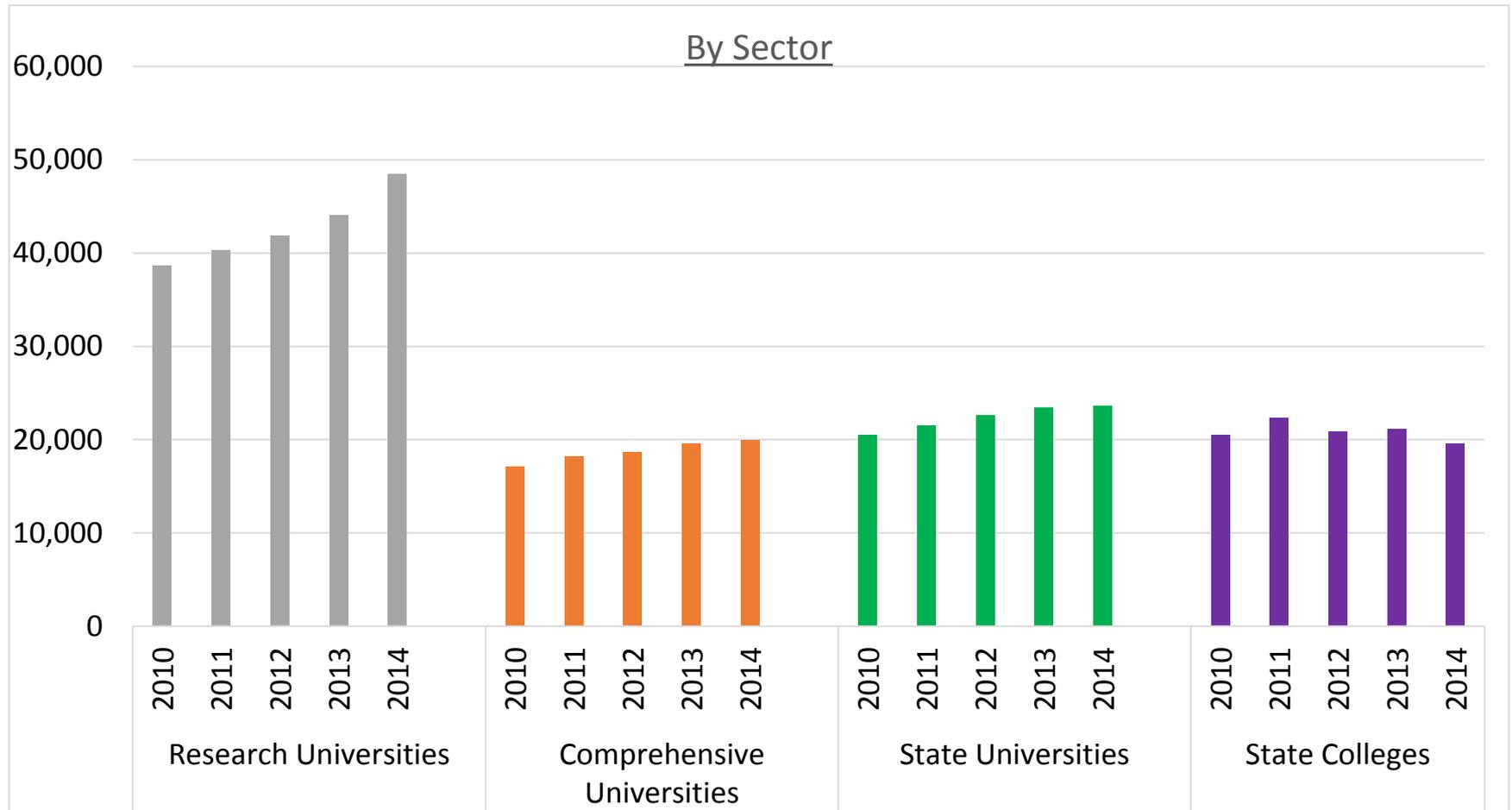
“Every student in America should be given the opportunity to reach his or her full potential.”

- National Science Board, 2010

STEM ATTAINMENT WITHIN USG

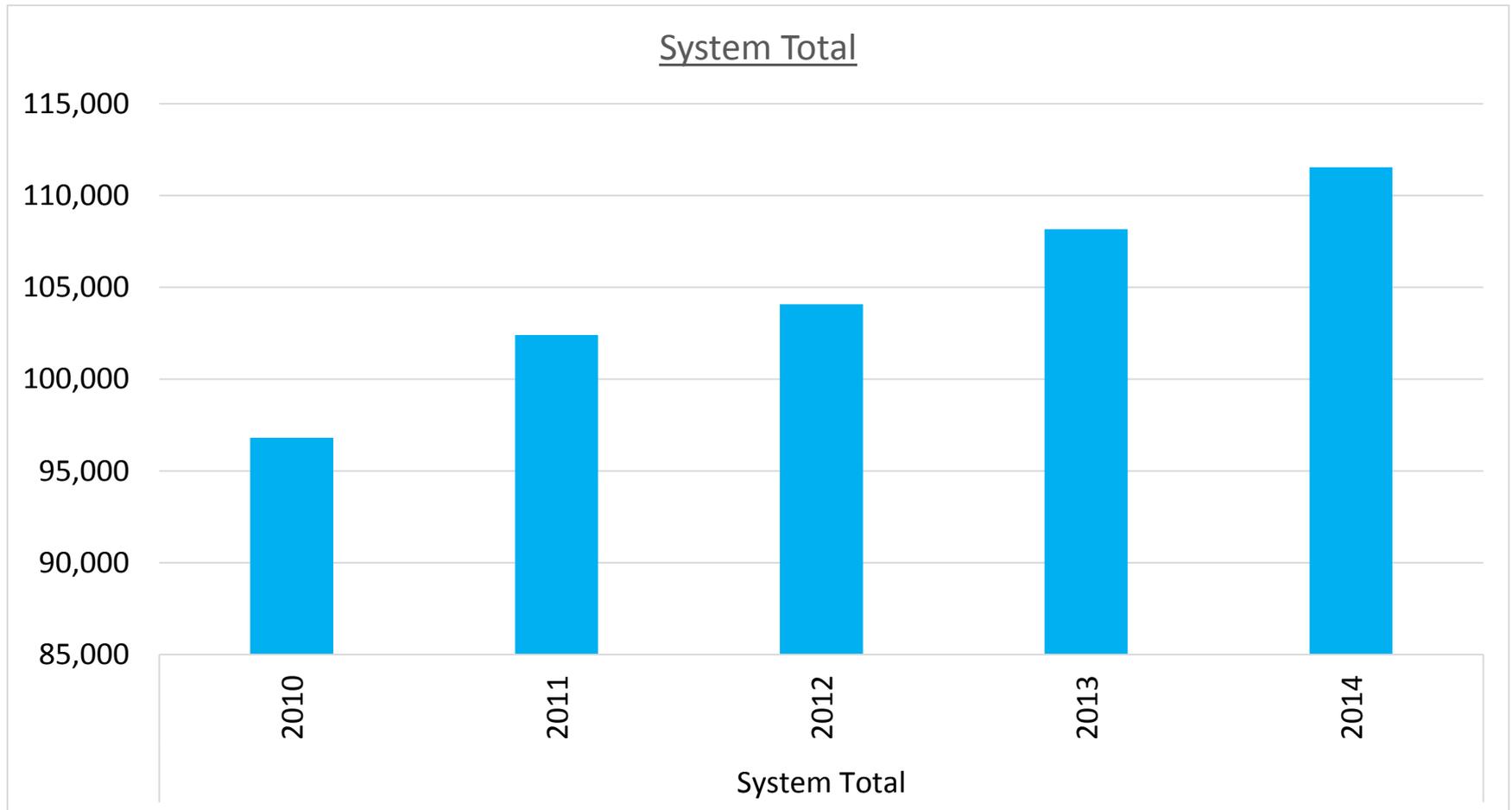
A closer look at enrollment, retention, and graduation over the past five years.

Enrollment in USG STEM Programs



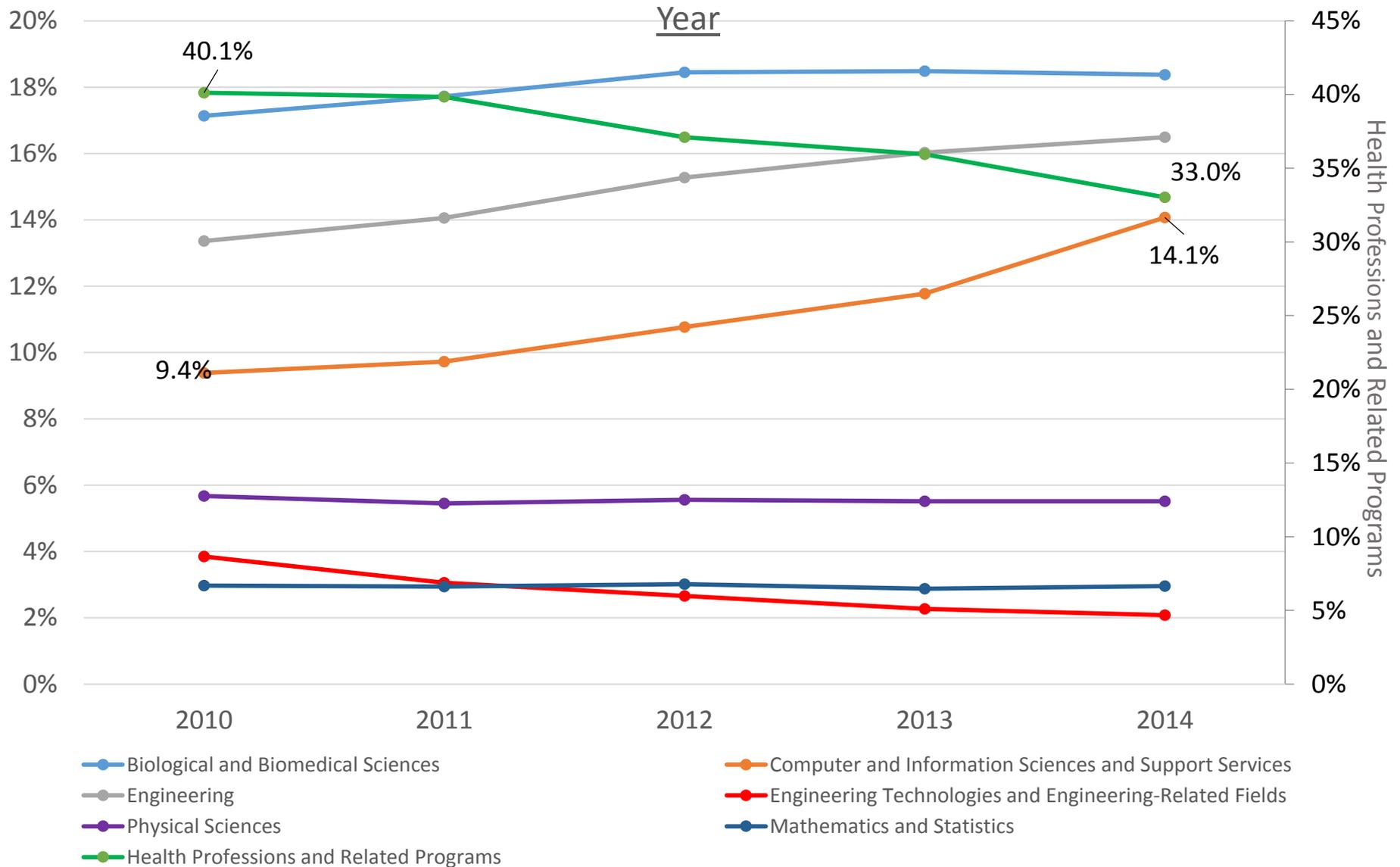
Source: USG Office of Research Policy Analysis

Enrollment in USG STEM Programs



Source: USG Office of Research Policy Analysis

Breakdown of Enrollment by STEM Subject (Largest Enrollment), by Fiscal



Source: USG Office of Research Policy Analysis

STEM Course Success - Science

Percentage of Students that Receive A, B, C in STEM Core Courses

	Biology		Chemistry		Physics	
	<u>1111</u>	<u>1112</u>	<u>1151</u>	<u>1152</u>	<u>1111</u>	<u>1112</u>
FY 11	68.4%	83.7%	69.7%	74.6%	73.1%	86.9%
FY 12	67.4%	81.6%	69.4%	73.3%	71.6%	87.3%
FY 13	71.7%	82.5%	68.3%	75.2%	75.0%	87.9%
FY 14	70.3%	83.6%	68.6%	78.1%	74.6%	86.9%

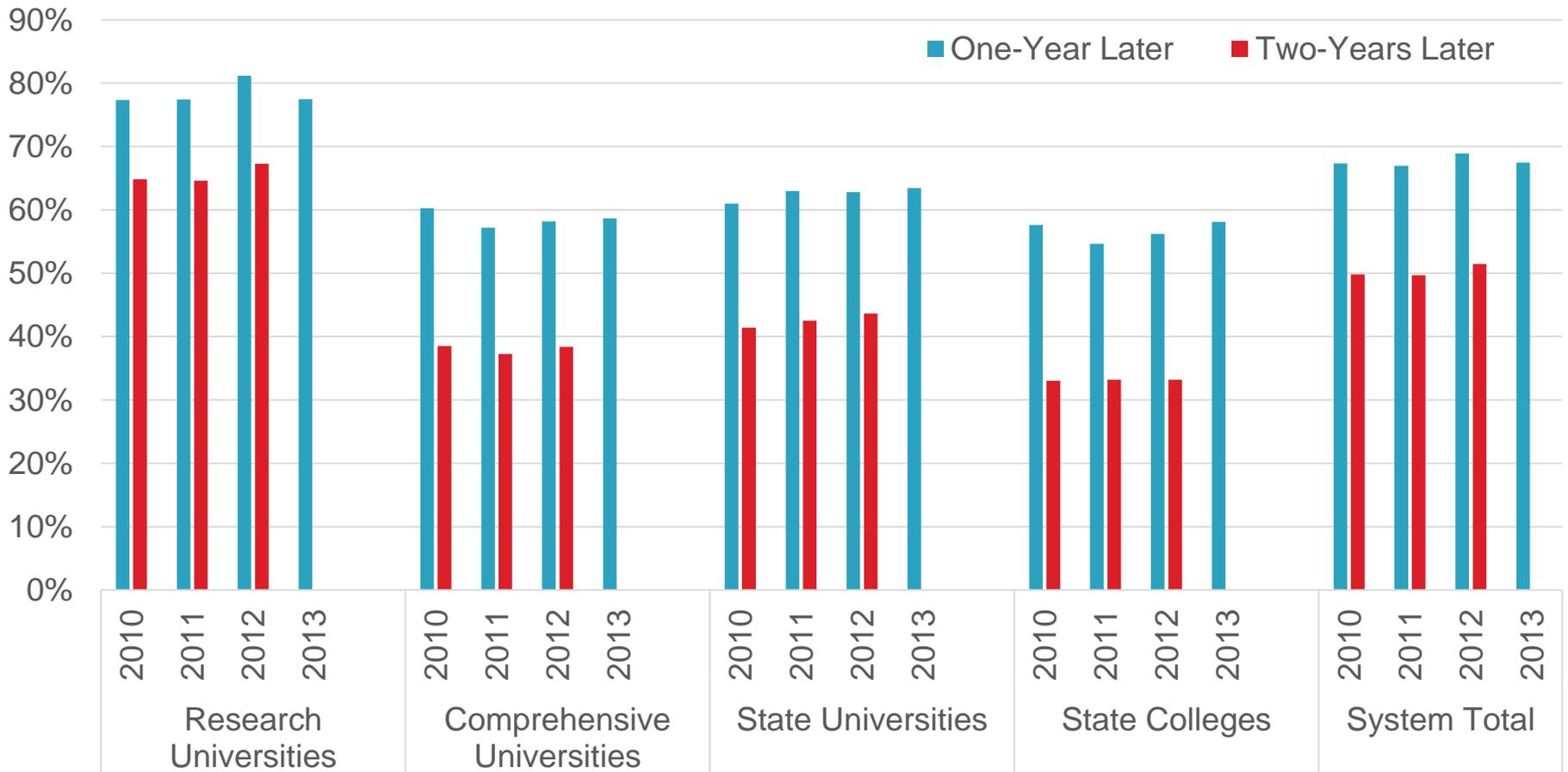
STEM Course Success - Mathematics

Percentage of Students that Receive A, B, C in STEM Core Courses

	<u>College Algebra (1111)</u>	<u>Pre-Calculus (1113)</u>	<u>Calculus I</u>	<u>Calculus II</u>
FY 11	56.8%	61.1%	63.8%	65.8%
FY 12	58.1%	63.5%	64.2%	67.5%
FY 13	59.7%	64.3%	64.8%	68.9%
FY 14	62.2%	63.5%	65.2%	68.8%

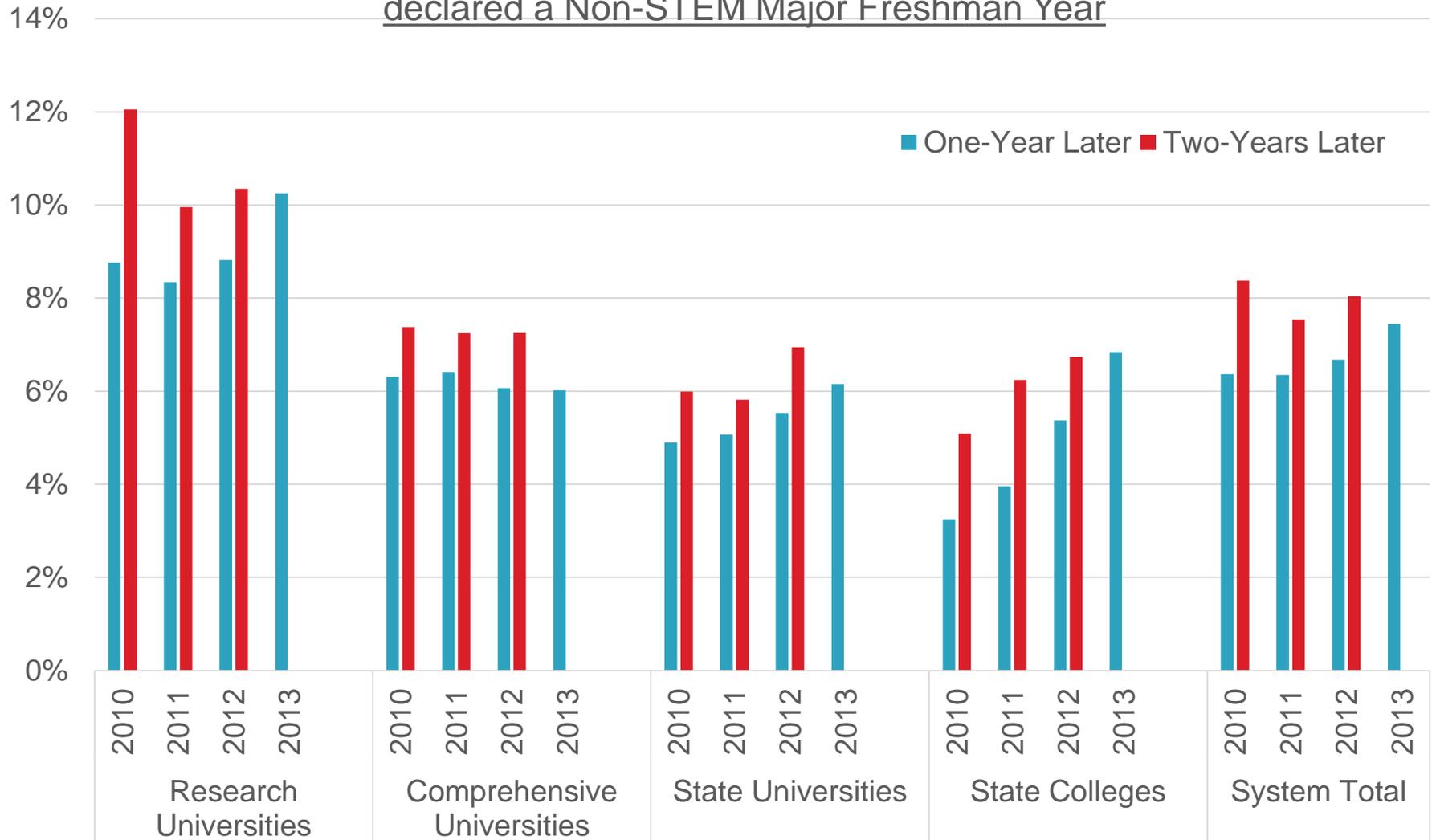
Retention Rates in STEM

Institutional Retention in a STEM Major for Bachelor's Seekers that declared a STEM Major Freshman Year



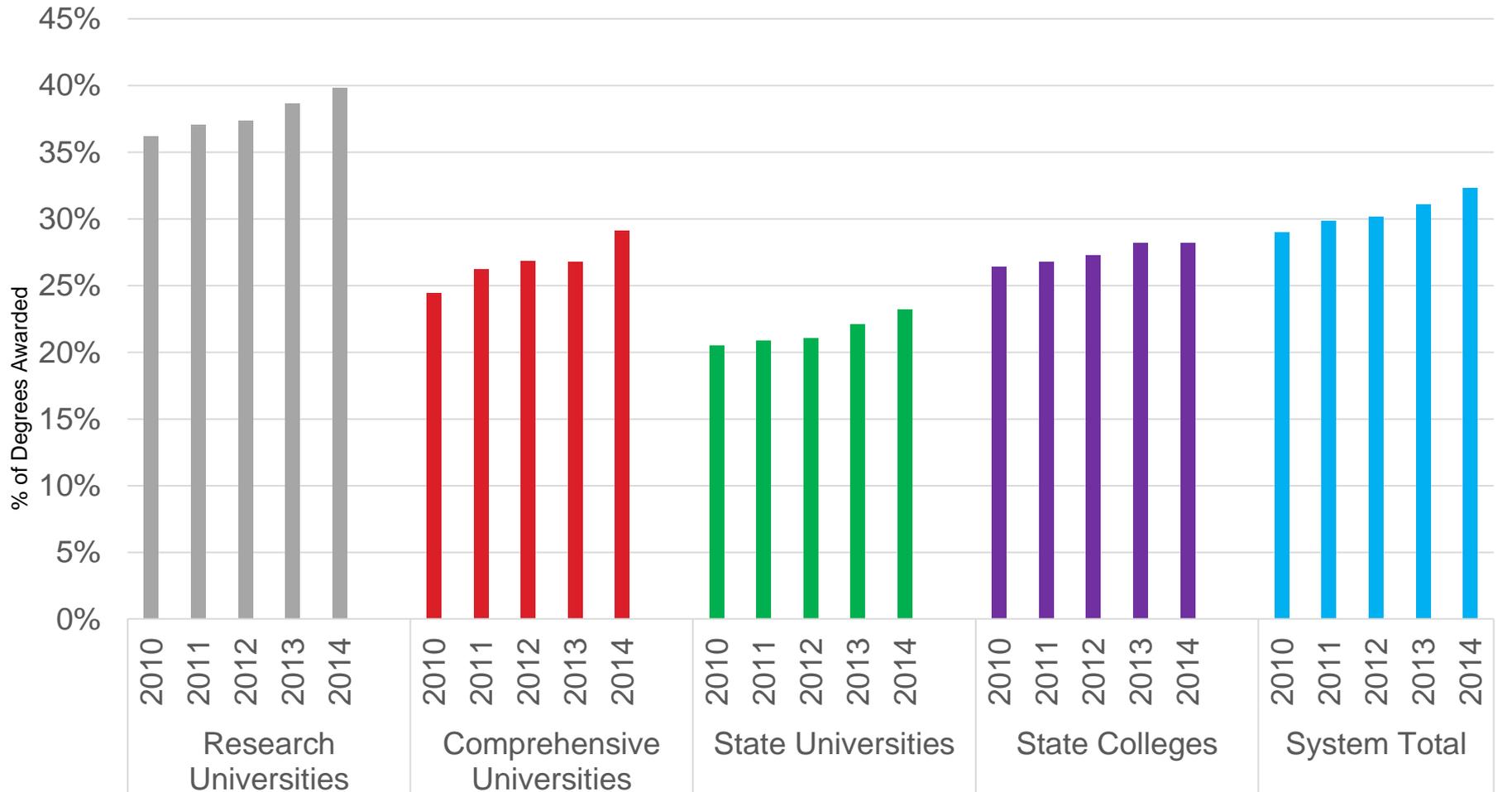
Retention Rates in STEM

Institutional Movement into a STEM Major for Bachelor's Seekers that declared a Non-STEM Major Freshman Year



STEM Degree Production

Percentage of Degrees Awarded in STEM, by Fiscal Year



Discussion

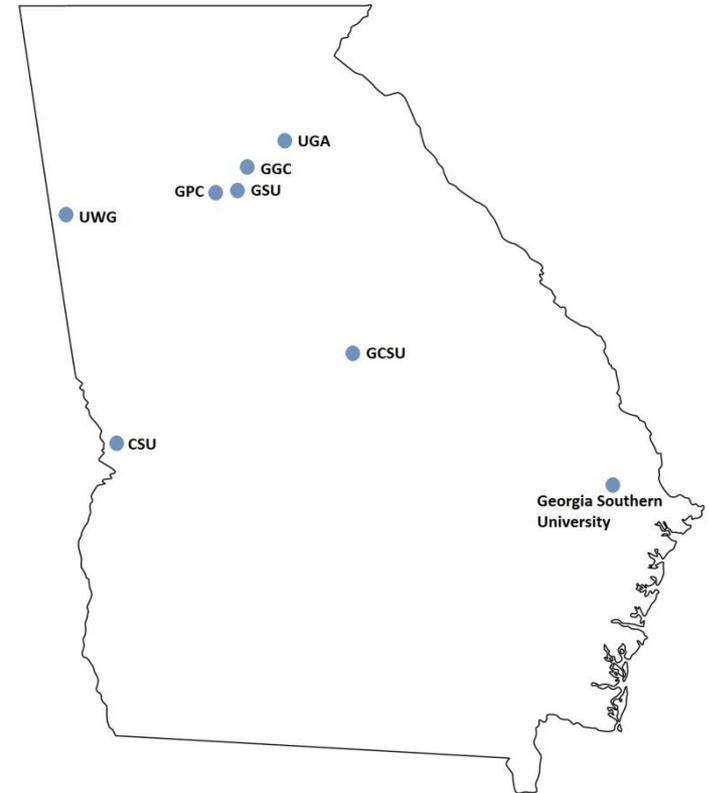
- Increasing enrollment in STEM across USG overall, but varying trends based on type of institution
- Despite overall improvements in gateway mathematics courses, progress is still needed
- Challenges in two-year retention rates in STEM suggests need for longer-term approaches
- However, students may still switch to STEM
- Overall, progress in the right direction—issue one of strength of that direction

STEM INITIATIVE HIGHLIGHTS

Selected highlights from the STEM Initiative's participating institutions.

Current Participating Institutions

- Columbus State University (CSU)
- Georgia College (GCSU)
- Georgia Gwinnett College (GGC)
- Georgia Perimeter College (GPC)
- Georgia State University (GSU)
- University of Georgia (UGA)
- University of West Georgia (UWG)
- Georgia Southern University
 - Scholarship of STEM Teaching and Learning Conference



Columbus State University: STEM Honors Camp

- Two-week camp for high school students throughout GA and AL
- Students live at CSU, engage in lab work and perform experiments
- Participate in activities at Coca-Cola Space & Science Center and Oxbow Meadows Environmental Learning Center
- 23 students in June 2014, 43% from underrepresented groups
- 83% reporting increased enthusiasm for STEM, 83% intend to pursue a STEM degree



Georgia College: STEM Retention Initiative

- Supplemental instruction program - Student instructors attend classes and lead collaborative learning sessions (usually twice weekly) to students
 - **Mathematics:** (computer lab model) students review project proposals and practice presentations before presenting projects to the class
 - **Chemistry:** (studio lab model) SIs mini-lectures on homework problems allow faculty to “flip” the classroom; SIs unpack content, allowing faculty to lead critical-thinking experiences in the classroom
 - **Biology:** (science hybrid lab/lecture model) SIs help with week – SIs connected more with students and developed a broader view of concepts
 - **Biology:** (science lab model) SIs assist instructor with proper lab techniques and interpretation

Georgia Gwinnett College: 4-Year Undergraduate Research Experience

- 4-Year Undergraduate Research Experience (4-yr URE)
 - Requirement for *all students* in School of Science & Technology
 - Focus on undergraduate research and internships
- Structured “Mini-Grant” Program to Support 4-yr URE
 - Course-embedded research projects
 - Individual, small group Undergraduate Research (STEC 4500) projects
 - Course redesigns and innovative instructional strategies
- Service learning course with Gwinnett County Schools
 - Student interns use content knowledge, skills to assist teachers in inquiry-based lessons and projects based on GCS Academic Knowledge Skills (AKS)
 - Plans to post projects, activities as “freeware”

Georgia Perimeter College: MESA Program

- Based on pioneering MESA (Mathematics, Engineering, Science Achievement) program in California for community/access colleges
- Workshops, academic and career advisement and counseling, transfer assistance to 4-year institutions, research/internship opportunities, linkages with student and professional organizations



Georgia State University: Academy for Future Teachers

- Three-week STEM summer program for APS and metro Atlanta high school students
- Focus on attracting talented students into the teaching profession and providing academic and professional preparation



University of Georgia: Project FOCUS

- Places college students with a science background in local schools to improve science awareness among K-8 school children.
- NOT a teacher training course, but a **service-learning** course: Students provide a much-needed service and learn about themselves in the process.
- 3-hour credit course at UGA

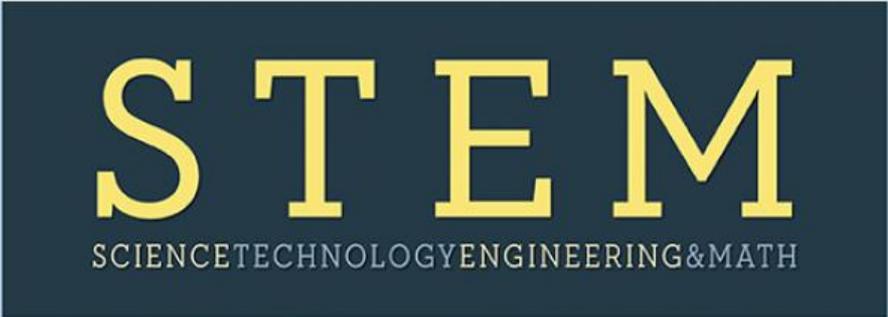


University of West Georgia: UWISE Program

- UWISE Program (University of West Georgia Institutional STEM Excellence)
 - Summer STEM Scholars Academy – Bridge program for incoming students at UWG
 - UWISE Learning Community – Students placed into cohort and take English I, Chemistry I, Precalculus/Calculus, and XIDS course on STEM professions together
 - XIDS Offerings: Credit-bearing courses on STEM careers
 - Peer-Mentoring and Undergraduate Research



Scholarship of STEM Teaching and Learning Conference



Georgia Scholarship of STEM Teaching & Learning Conference
MARCH 4, 2016

Board of Regents of the University System of Georgia
GEORGIA SOUTHERN UNIVERSITY

[About STEM](#) [2016 STEM Conference](#) [Conference Archives](#) [USG Stem Initiative](#) [Resources](#)

Fifth Annual Scholarship of STEM Teaching and Learning Conference

Thursday, March 3, 2016

7 to 9 p.m. – Poster Session and Reception
Statesboro Holiday Inn

Friday, March 4, 2016

8 a.m. to 4:30 p.m. – Concurrent Sessions

Nessmith-Lane Conference Center at Georgia Southern University

Video_Button

VIEW THE 2016 VIDEO!

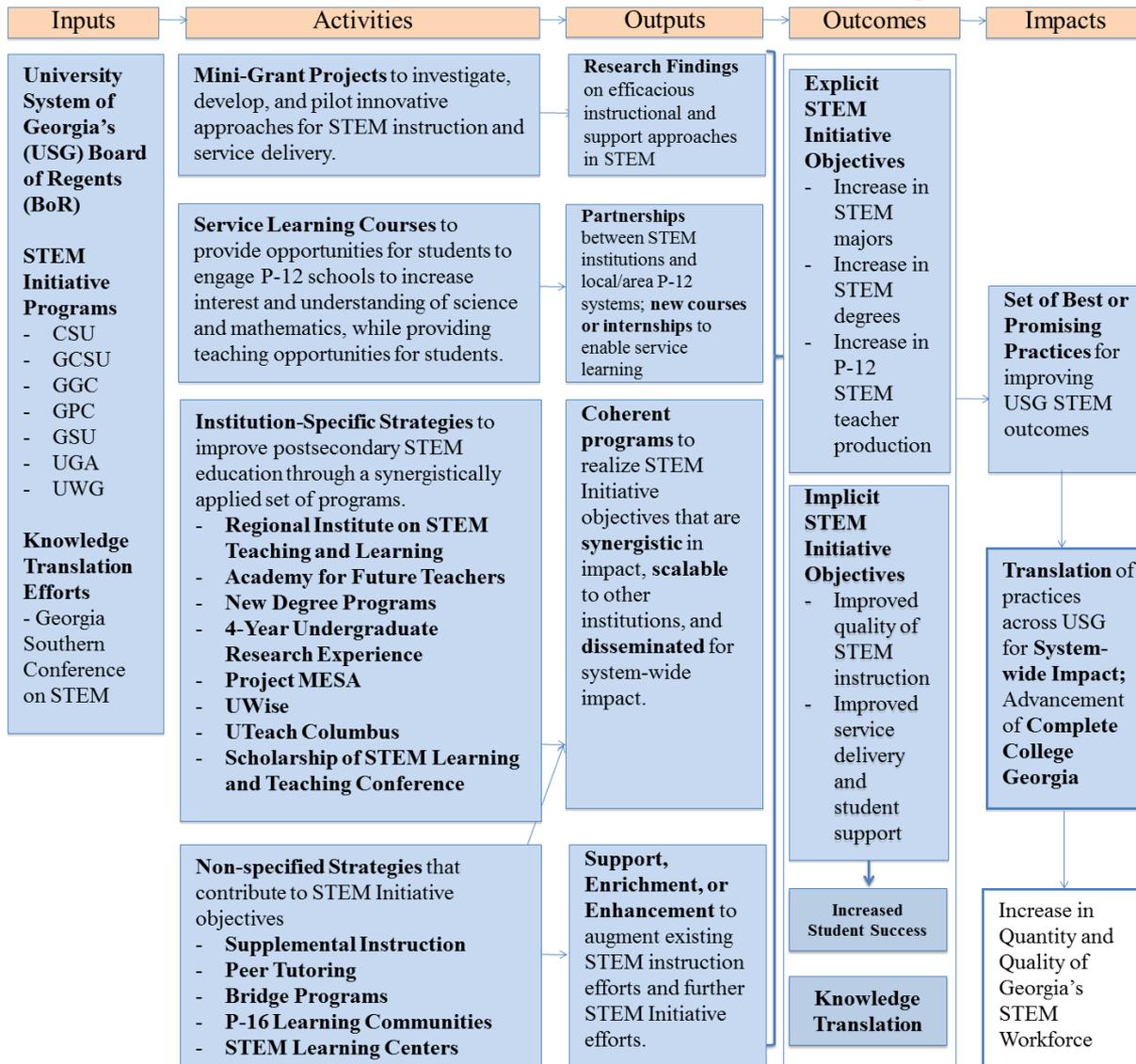
5th Annual Scholarship of
STEM
Teaching and Learning Conference
March 4, 2016



FINDINGS FROM EVALUATION

Highlights from STEM II Evaluation findings, FY2011-
FY2015

USG STEM Initiative Logic Model



Enrollment in STEM Degree Programs

Actual, Reported Percent Change (Overall Initiative)

- *AY2011-2012 to AY 2012-2013* 9.97%
- *AY2012-2013 to AY 2013-2014* 26.44%
- *AY2013-2014 to AY 2014-2015* **-8.86%**
- ***OVERALL CHANGE*** **26.72%**

Adjusted Percent Change (Proportion of Majors)

- ***OVERALL CHANGE*** **-2.20% to 5.05%**

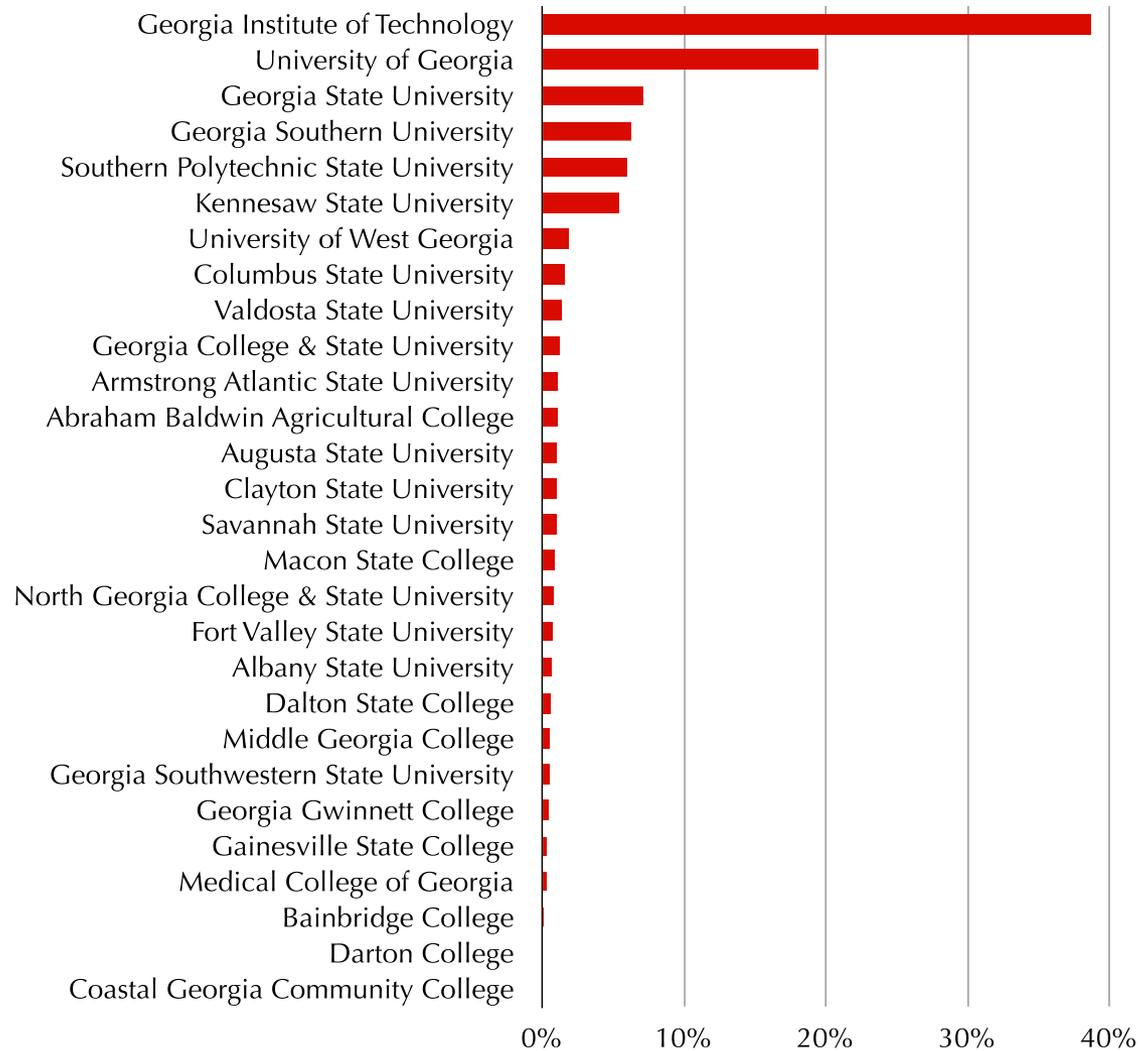
FUTURE DIRECTIONS

Some considerations on the future of the STEM Initiative.

Revised STEM Initiative

- Equitability and Opportunity – Need for Greater Participation by USG Institutions
- Specificity – Respect for Institutional Missions and Needs, Focus on Formative Evaluations for Improvement
- Attainment – Furthering the Aims of Complete College Georgia (CCG) through STEM *For All Learners*
- Knowledge Translation – More Effective Means of Disseminating Promising Practices, Focus on Adapting Rather than Replication

USG Institutional Participation



Thank You!

We acknowledge the support of the University System of Georgia's (USG) Office of Educational Access and Success (OEAS), including the leadership of Sheila Jones (STEM Initiative Coordinator) and Rob Anderson (Vice Chancellor for Educational Access and Success). We also acknowledge the support of the Office of Research & Policy Analysis (RPA), including Angela Bell (Associate Vice Chancellor of Research & Policy Analysis) and Rachana Bhatt (Senior Research Associate).

Any opinions, findings, and conclusions or recommendations expressed in this material are those of the evaluator and do not necessarily reflect the views of the USG or the Board of Regents.