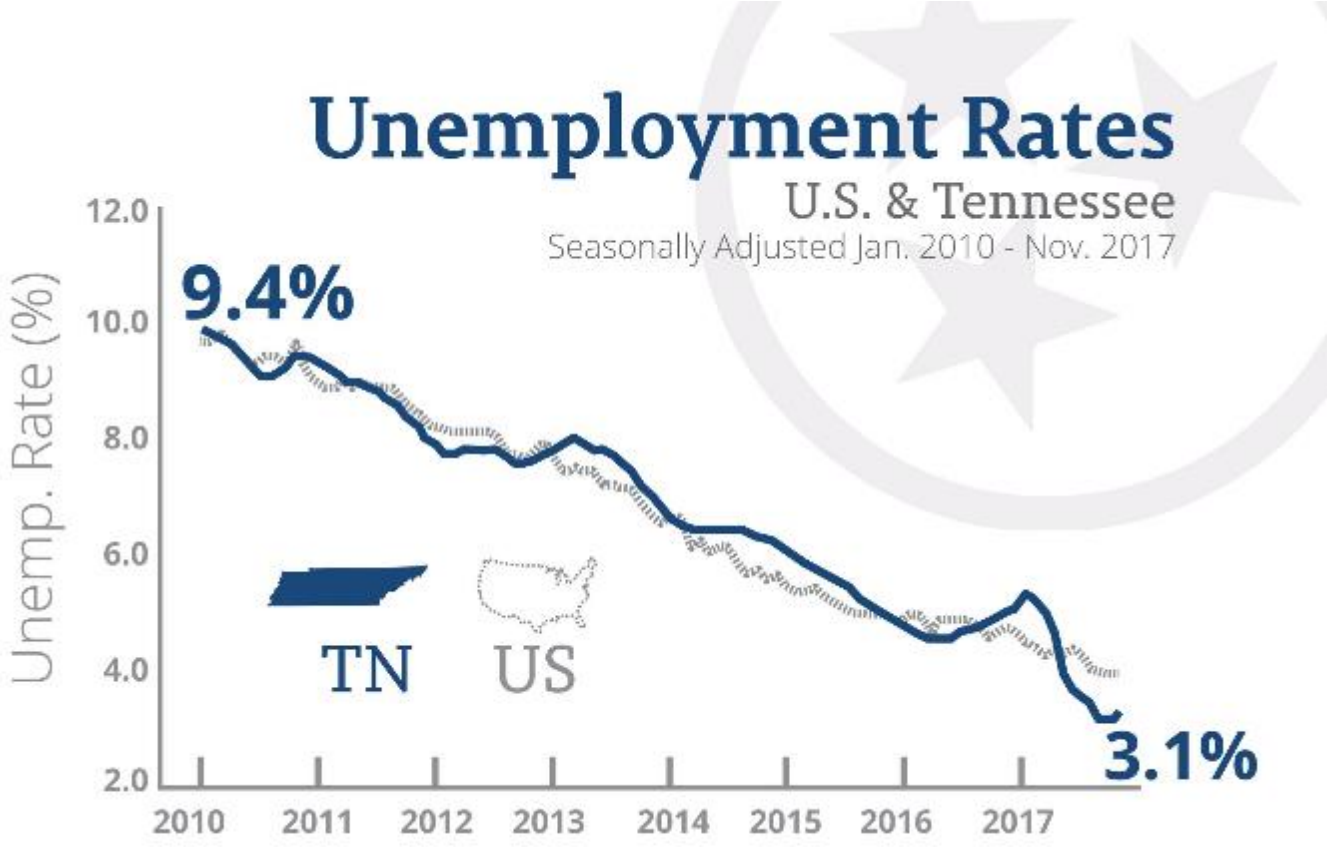
Tennessee Succeeds and STEM Education

ETSU STEM Conference

Dr. Candice McQueen I Commissioner I May 31, 2018

Our State is Showing Historic Success

- We have **incredible economic strength**
  - Record low unemployment rate
  - #1 in small business job growth

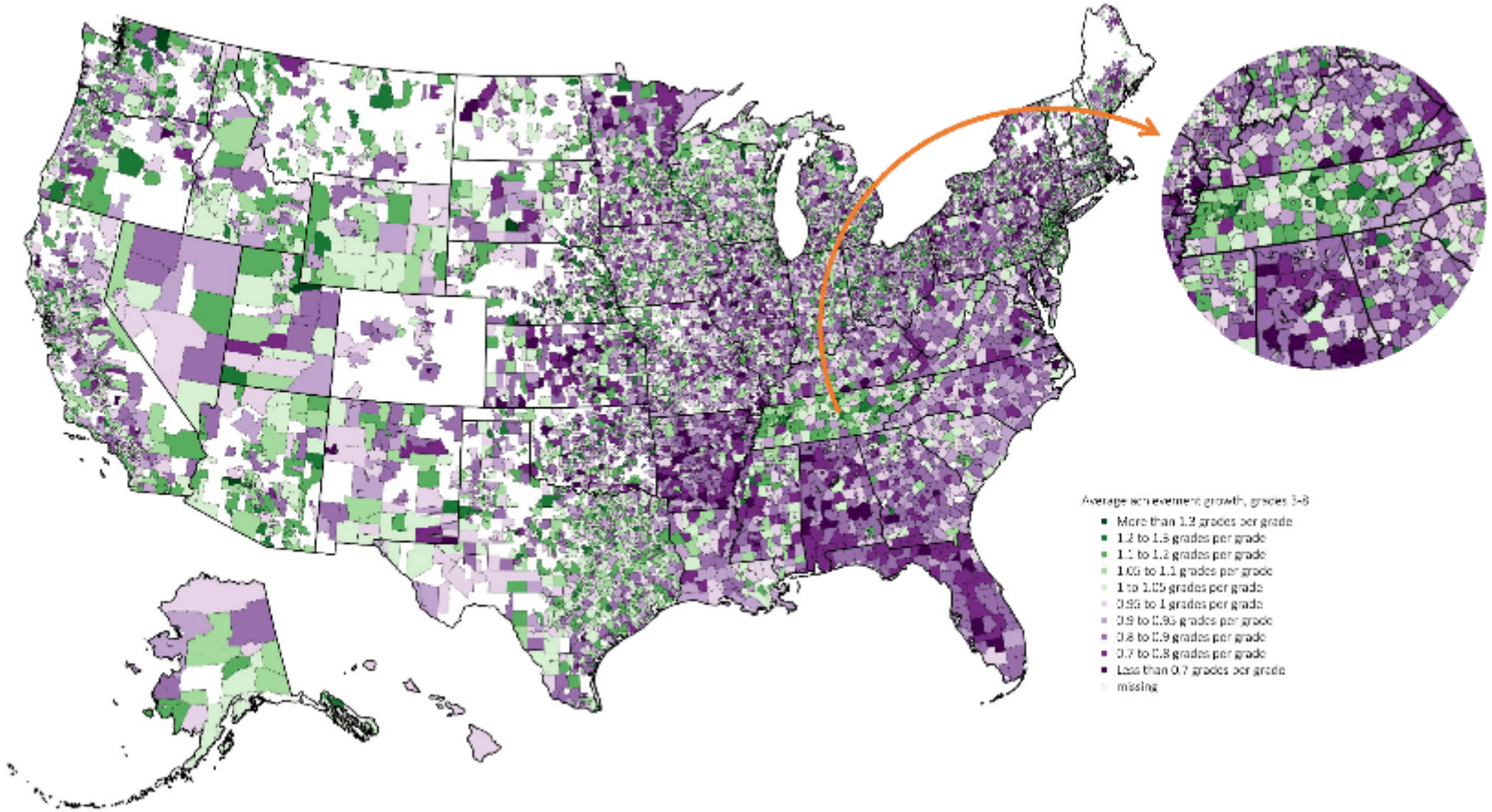


Our State is Showing Historic Success

- And we believe **education is the reason why**
  - Record high graduation rate
  - Record high ACT composite
  - Nationally recognized strength in career and technical education and aligned pathways to workforce
  - First in the nation to remove financial barriers with Tennessee Promise
  - Community college freshmen requiring remediation is down by 14.4 percentage points since 2011
  - **More students going onto college – and being successful when they get there**

Tennessee's Progress Literally Stands Out

Average Test Score Growth Rates (Math and Reading Averaged), US Public School Districts, 2009-2015



Stanford, December 2017

Rigor of State Proficiency Standards, 2017

No. 11 Tennessee

Overall grade (2017)

A A- B+ B B- C+ C C- D+ D D- F

Difference in percent proficient on state exam and NAEP*

-2.60

Math (2017)

4th graders

A A- **B+** B B- C+ C C- D+ D D- F

8th graders

A A- **B+** B B- C+ C C- D+ D D- F

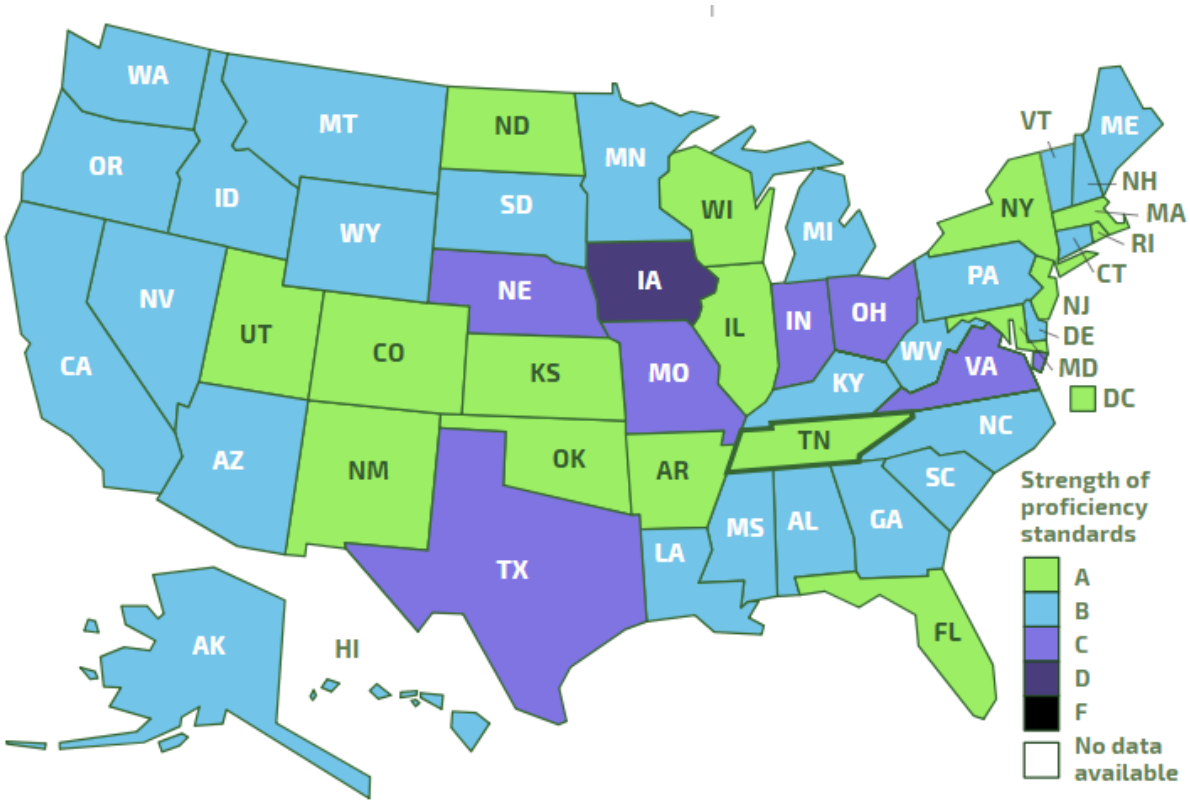
Reading (2017)

4th graders

A A- B+ B B- C+ C C- D+ D D- F

8th graders

A A- B+ B B- C+ C C- D+ D D- F



Tennessee moves from F to A

Candice McQueen @McQueenCandice · 1h

Incredibly proud to see a decade of work is paying off! In new study from @EducationNext, TN is the top state to close the "honesty gap" & we stand out from other states as our higher standards has gone hand in hand with gains in student achievement. Gone from an "F" to an "A"!

Many States with Low Grades in 2009 Make Dramatic Improvements by 2017 (Table 2)

In total, four of five states with F grades in 2009 achieved a C+ or higher in 2017, and nine of 24 states with D- to D+ grades in 2009 received A grades in 2017. Minnesota, Iowa, and Missouri made the least amount of progress between 2009 and 2017—with the rigor of Missouri's standards actually declining.

IMPROVEMENT RANK	STATE	STATE GRADES BY YEAR 2009	2015	2017	CHANGE IN DIFFERENCE BETWEEN STATE AND NAEP (2009 - 2017)
1	Tennessee	F	B-	A	60.81
2	Georgia	F	B+	B+	48.95
3	Illinois	D-	A	A	48.49
4	Kansas	D	A	A	47.84

Education Next, May 2018

We've Made Progress Toward Our Goals

Goal 1

Tennessee will rank in the top half of states on NAEP by 2019

In 2015, we moved into the top 25 on three exams – an incredible jump from just a few years ago, when we were in the bottom 10.

Goal 2

75 percent of third graders will be proficient in reading by 2025

We have a range of work underway through the Read to be Ready campaign and our aligned initiatives to strengthen early literacy.

Goal 3

The average ACT composite in Tennessee will be 21 by 2020

Our class of 2016 has already increased the average to 20.1, with more students taking the exam.

Goal 4

Most of the class of 2020 graduates will earn a postsecondary certificate, diploma, or degree

We've been nationally recognized for our work to increase access to college and strengthen career & technical education.

STEM is Directly Connected to Our Goals

- The **new unit starters for K-3 reading** focus on science content
  - Provide an **innovative and comprehensive** way to build knowledge of science content while learning reading and language arts
  - Units include many components that build conceptual knowledge embedded in science standards
- **Students are more engaged**, while building skill-based competencies
  - Teachers are going deeper and raising expectations
  - Students are retaining high-level vocabulary and scientific concepts

STEM is Directly Connected to Our Goals

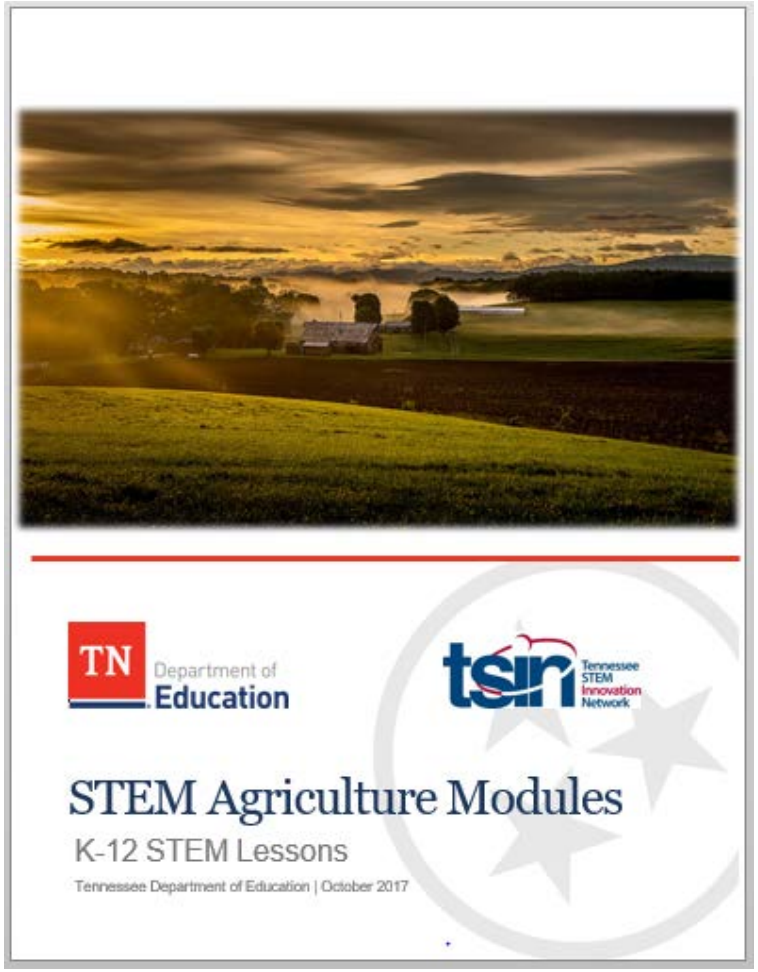
- CTE pathways are accessible to more students and we continue to expand options, including those connected to STEM
- In 2017, **76% of CTE programs directly aligned to regional labor market** needs compared to 26% in 2015
  - Each of the 80 approved industry certifications is aligned to a specific program of study within one of the 16 approved career clusters
- **STEM career cluster offers 5 programs of study** with a certification in *Solidworks Associate*
  - Other career clusters are connected to STEM, like advanced manufacturing, which has increased 300% since 2015

Our STEM Strategy will support our continued success.

We are Creating STEM Academic Modules

- Provides educators 4 complete sets of K-12 modules that set the standard and expectation as to how STEM can be naturally integrated into the classroom using state standards along with STEM strategies and applications
  - Agriculture
  - Manufacturing
  - Technology
  - Health Science

- Will be released this summer (2018)



We are Creating a STEM Handbook for Counselors

- The department will release new counselor STEM handbook this summer
- Serve as a resource guide for school counselors in grades K-12 to increase student awareness and knowledge of STEM-related careers
- Resources will be designed for specific grade bands and will have connections to counselor standards referenced throughout the handbook

We are Piloting STEM Micro-Credentials

- Pilot for Tennessee STEM micro-credentials begins fall 2018
- The pilot serves to identify and recognize educators in their commitment to **teaching STEM and integrating strategies that ultimately prepare students for success in the 21st century**
- Educators will be able to earn five STEM micro-credentials highlighting five focus areas including:

1. Infrastructure	2. Curriculum & Instruction	3. Professional Development
4. Achievement	5. STEM Community and Postsecondary Partnerships	

  - Once an educator shows evidence of proficiency and earns all five STEM micro-credentials, they will receive the **STEM Master Educator** micro-credential

Our STEM Micro-Credentials are Comprehensive

- **STEM Infrastructure:** developing skills that strengthen teachers' ability to foster collaborative environments that emphasizes inquiry and critical thinking
- **STEM Curriculum and Instruction:** supporting PBL focus, exploring STEM careers, and integrating technology for students
- **STEM Professional Development:** developing quality PBL units that incorporate STEM expertise for teachers
- **STEM Achievement:** utilizing performance based assessments in the classroom
- **STEM Community and Postsecondary Partnerships:** providing students with WBL opportunities, identifying partnerships, etc.

STEM Infrastructure: Designing a Collaborative Learning Environment

STEM Micro-Credential #1

- Educators will develop skills that strengthen their ability to foster collaborative environments that emphasizes inquiry and critical thinking.

- Evidence Examples:
  - Review your scope and sequence during this quarter and prepare a **STEM Integration Map** that identifies (1) areas of STEM integration and (2) additional opportunities to enhance your curriculum with STEM strategies.
  - Review your classroom set up to evaluate and/or design a setting of collaborative learning.

STEM Curriculum and Instruction: Creating Authentic Problem Based Learning Experiences

STEM Micro-Credential #2

- Educators will learn how to (better) provide quality STEM learning experiences that are student-led, integrate real-world content, and create multiple opportunities for promoting student collaboration.

- Evidence Example:
  - Revisit your Action Plan for a cross-curricular STEM lesson and create a **PBL unit** with your collaborative partner.

STEM Professional Development: Quality STEM PD Practices

STEM Micro-Credential #3

- Educators will engage in continuous learning based on student results, personalized goal setting, and peer observations to strengthen inquiry-based instructional practices.

- Evidence Examples:
  - Identify a unique **professional learning goal** for integrating STEM instruction.
  - Identify three **community partners** (and their areas of expertise) that could strengthen your understanding of STEM integration and 21st Century Learning Skills.

STEM Achievement: Developing Performance Assessments

STEM Micro-Credential #4

- Educators will learn to incorporate innovative performance assessments to measure student outcomes within classroom instruction.

- Evidence Examples:
  - Design a **pre/post assessment** to show student growth for a topic you plan to teach within the next 4 weeks.
  - Thinking about the PBL unit created in Micro-Credential #2, **design a rubric** that assesses student learning.

STEM Community and Postsecondary Partnerships: Incorporating Partner Supported STEM Experiences

STEM Micro-Credential #5

- The educator intentionally establishes connections between curriculum taught and practical applications outside of the classroom.

- Evidence Example:
  - Plan and implement a partner supported **STEM experience** involving industry partners to provide authentic, real-world STEM content into your instruction (work-based learning activity, partner supported PBL unit, STEM industry field trip, internship or mentorship).

More Opportunities for Partnership with TSIN

We have established a Rural STEM Collaborative

- Year-long cohort of educators from across Tennessee engaged in identifying issues surrounding STEM education
- Develop targeted solutions to address those needs at a classroom, school, or district level
- 43 educators in 24 counties were represented this year

We have developed an Innovative Leaders Institute

- Year-long training and mentoring experience for educators led by some of the top STEM leaders and innovative school leaders in our state
- Currently 123 graduates

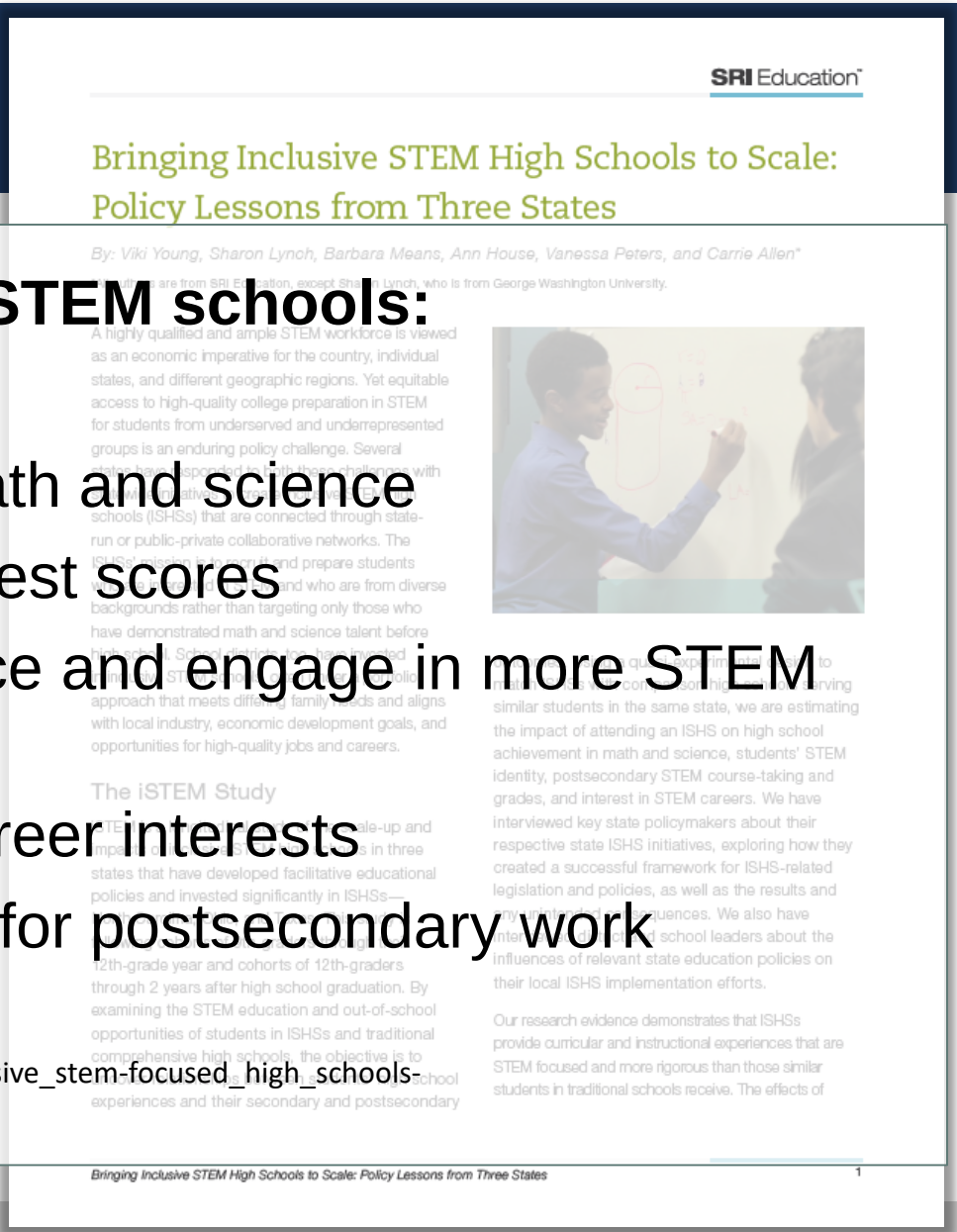
Tennessee STEM School Designation

What we know?

Students from inclusive STEM schools:

- Take more advanced math and science
- Have higher GPAs and test scores
- Identify more with science and engage in more STEM extracurriculars
- Have stronger STEM career interests
- Have higher aspirations for postsecondary work

https://www.sri.com/sites/default/files/publications/inclusive_stem-focused_high_schools-_stem_education_policy_and_opportunity_structures.pdf



SRI Education

Bringing Inclusive STEM High Schools to Scale: Policy Lessons from Three States

By: Viki Young, Sharon Lynch, Barbara Means, Ann House, Vanessa Peters, and Carrie Allen*

A highly qualified and ample STEM workforce is viewed as an economic imperative for the country, individual states, and different geographic regions. Yet equitable access to high-quality college preparation in STEM for students from underserved and underrepresented groups is an enduring policy challenge. Several

schools (ISHSs) that are connected through state-run or public-private collaborative networks. The

and who are from diverse backgrounds rather than targeting only those who have demonstrated math and science talent before

approach that meets differing family needs and aligns with local industry, economic development goals, and opportunities for high-quality jobs and careers.

The iSTEM Study

states that have developed facilitative educational policies and invested significantly in ISHSs—

12th-grade year and cohorts of 12th-graders through 2 years after high school graduation. By examining the STEM education and out-of-school opportunities of students in ISHSs and traditional comprehensive high schools, the objective is to

experiences and their secondary and postsecondary

similar students in the same state, we are estimating the impact of attending an ISHS on high school achievement in math and science, students' STEM identity, postsecondary STEM course-taking and grades, and interest in STEM careers. We have interviewed key state policymakers about their respective state ISHS initiatives, exploring how they created a successful framework for ISHS-related legislation and policies, as well as the results and

school leaders about the influences of relevant state education policies on their local ISHS implementation efforts.

Our research evidence demonstrates that ISHSs provide curricular and instructional experiences that are STEM focused and more rigorous than those similar students in traditional schools receive. The effects of

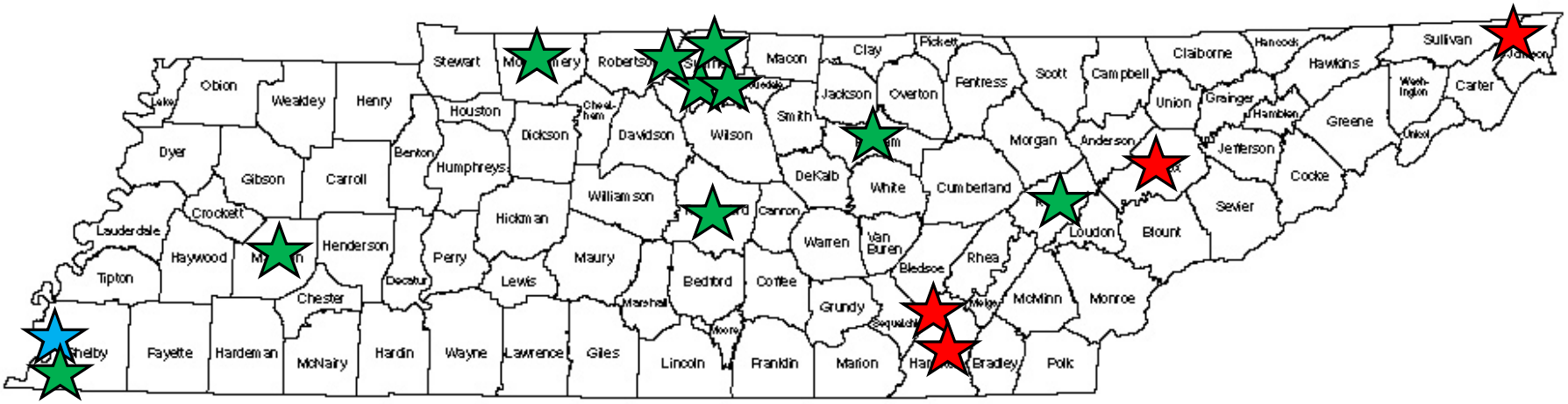
Bringing Inclusive STEM High Schools to Scale: Policy Lessons from Three States 1

We have created a TN STEM School Designation

- In order to be a national leader in STEM, we must
  - Integrate quality STEM opportunities
  - Develop critical thinking skills and provide new experiences for students
  - Identify and recognize schools committed to STEM
- The STEM Designation provides guidance, examples, and recognition for Tennessee schools
- This process is aligned to the STEM Strategic Plan and will continue to build on the existing work and expand new opportunities

2018 Tennessee STEM School Designation

2018 STEM School Designated Recipients



Elementary School

Middle School

High School

Questions?

TN Department of Education

Districts and schools in Tennessee will exemplify excellence and equity such that all students are equipped with the knowledge and skills to successfully embark on their chosen path in life.

Excellence | Optimism | Judgment | Courage | Teamwork