Supporting STEM in Rural Contexts

December 13, 2017
12:00-1:00pm CT

REL MIDWEST
Regional Educational Laboratory

Meet the presenters:

Haidee Williams, Ph.D.

Senior Technical Assistance Consultant, American Institutes for Research

David Burns

Director of STEM Learning Networks, Battelle Education

Kelly Gaier Evans

STEM Relationship Manager, Battelle Education

Meet the presenters:

Sally Pardue,
Ph.D.

Director of the Millard Oakley STEM Center, Tennessee Tech University

Billie Jo Day,
Ph.D.

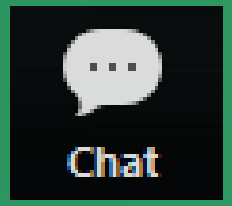
Researcher, REL Midwest

Agenda

1. Reviewing the Research
2. How Can STEM Learning Networks Support Schools?
3. The STEMmobile Initiative
4. Q&A Session

Using the Zoom Platform

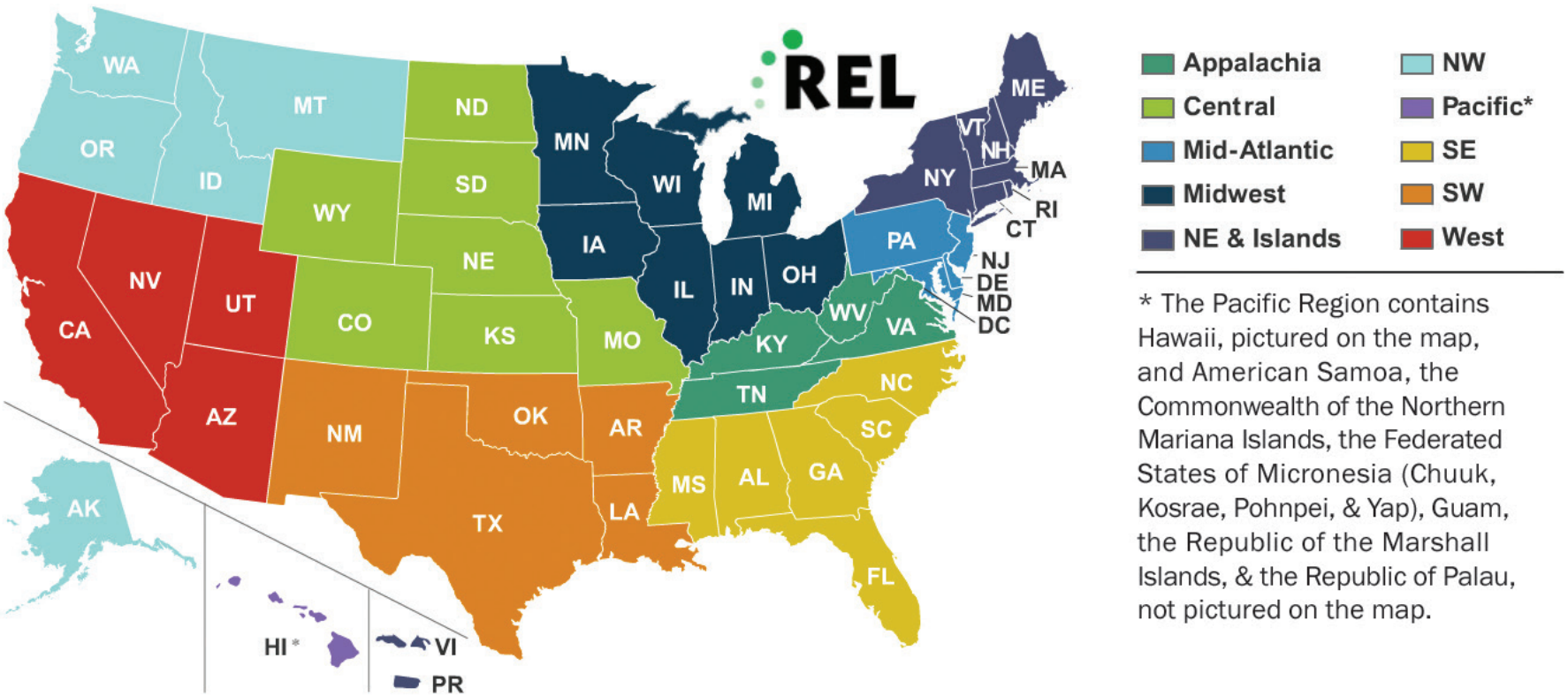
- If you aren't already connected to audio, click **Join Audio** in the Zoom toolbar.
  - You have the option to dial into the phone line or listen through computer audio.



- Click on the **Chat** box to introduce yourself, ask questions for the presenters, or let us know about any technical issues.

- We have live closed captioning available during the webinar – to see the captions, click on **Closed Caption**.

Regional Educational Laboratories



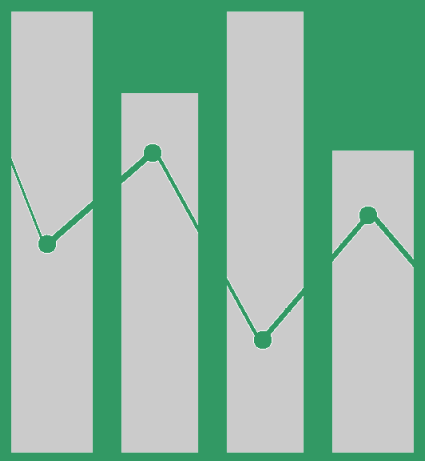
The RELs are funded by the U.S. Department of Education's Institute of Education Sciences (IES).

With whom does Regional Educational Laboratory (REL) Midwest work?

School districts, state education agencies, and other education organizations in Illinois, Indiana, Iowa, Michigan, Minnesota, Ohio, and Wisconsin

What does REL Midwest do?

Applied research, technical assistance, and engagement activities to help partners understand research and evidence.



Collaborative Research Partnerships

Four research alliances:

- Midwest Alliance to Improve Teacher Preparation
- Midwest Achievement Gap Research Alliance
- Midwest Career Readiness Research Alliance
- Midwest Early Childhood Education Research Alliance

One networked improvement community:

- Iowa Learning and technology Networked Improvement Community

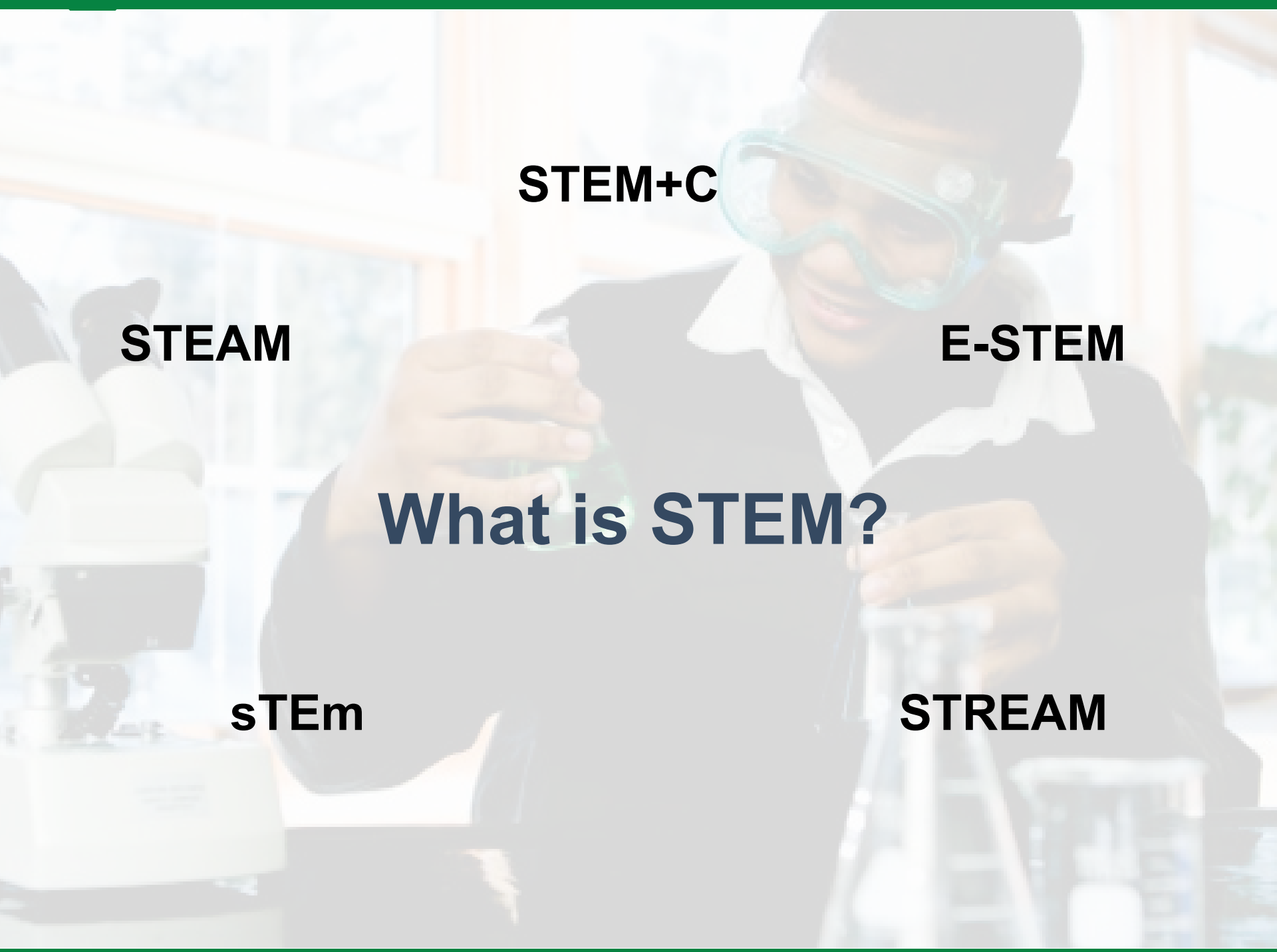
Reviewing the Research

Haidee Williams, Ph.D.
Senior Technical Assistance Consultant
American Institutes for Research

REL MIDWEST
Regional Educational Laboratory
at American Institutes for Research

What is Rural?

It depends on who you ask.



What is STEM?

STEM+C

STEAM

E-STEM

sTEm

STREAM

Why should STEM be an option for students in rural schools?

What are some rural STEM careers?

What is your STEM learning ecosystem?

Battelle and STEM: National Impact, Rural Success

David Burns | Director, Education Operations

Kelly Gaier-Evans | STEM Relationship Manager

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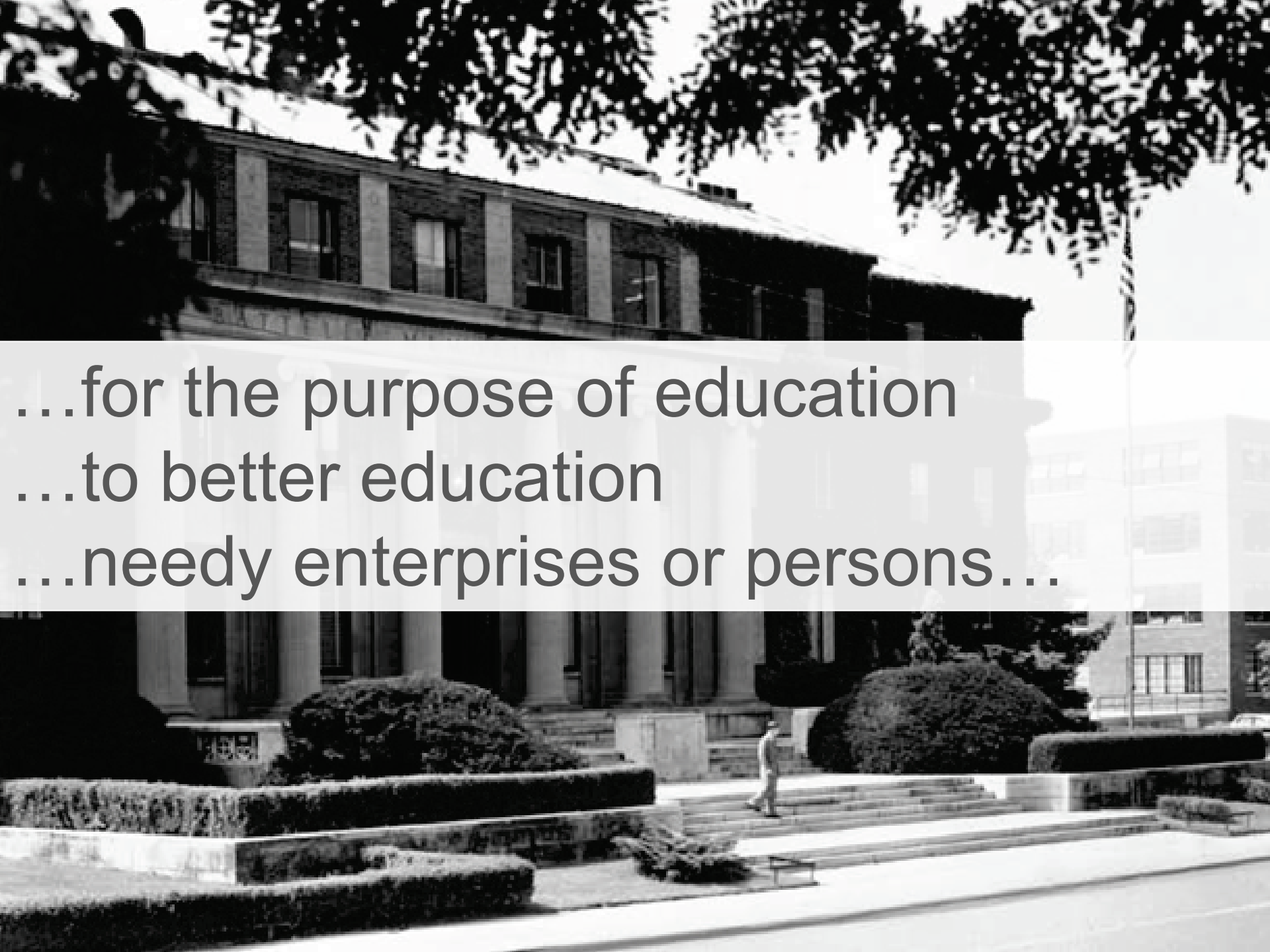

…for the purpose of education
…to better education
…needy enterprises or persons…

Our Mission

To translate scientific discovery and technological advances into societal benefits

Education at Battelle

1 school

2006

Ronny Oppong, Metro class of 2010

“I'm discovering and inventing, but I’m also given opportunities to apply new ideas to problems in the real world.”

“If it were my decision, STEM would be part of every school."

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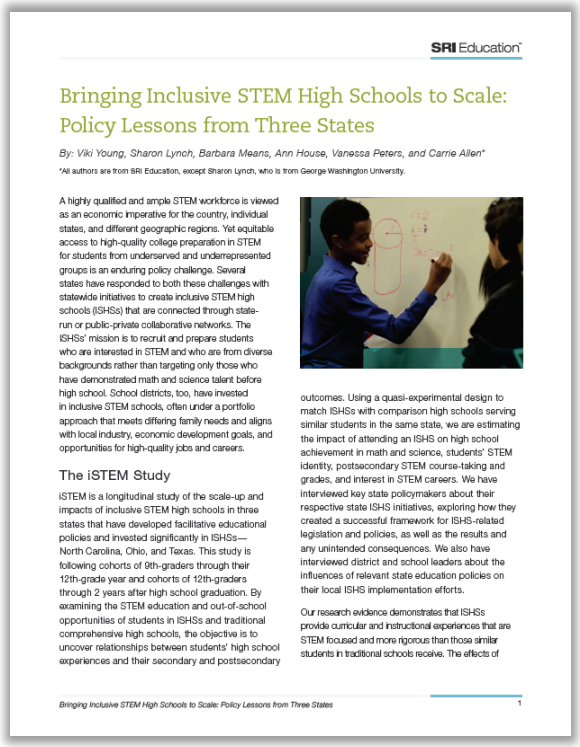
Metro High School

- Established in 2006 – inclusive lottery admission
- 100% graduation rate
- 100% college admittance rate
- 85% of students earn college credit
- Student ACT scores consistently beat Ohio's average (2013: 24.3 vs 21)

2017 Study

Students from inclusive STEM schools like Metro:

1. Take more advanced math and science
2. Identify more with science and engage in more STEM extracurriculars
3. Have stronger STEM career interests
4. Have higher aspirations for college
5. Have higher GPAs and test scores



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**

*All authors are from SRI Education, except Sharon Lynch, who is from George Washington University.

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 states have responded to both these challenges with statewide initiatives to create inclusive STEM high schools (ISHSs) that are connected through state-run or public-private collaborative networks. The ISHSs' mission is to recruit and prepare students who are interested in STEM and who are from diverse backgrounds rather than targeting only those who have demonstrated math and science talent before high school. School districts, too, have invested in inclusive STEM schools, often under a portfolio 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

iSTEM is a longitudinal study of the scale-up and impacts of inclusive STEM high schools in three states that have developed facilitative educational policies and invested significantly in ISHSs—North Carolina, Ohio, and Texas. This study is following cohorts of 9th-graders through their 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 uncover relationships between students' high school experiences and their secondary and postsecondary outcomes. Using a quasi-experimental design to match ISHSs with comparison high schools serving 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 any unintended consequences. We also have interviewed district 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

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Science

Technology

Engineering

Mathematics

Strategies

That

Engage

Minds

What does that look like?

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Education at Battelle

BILL & MELINDA GATES foundation

PRESS ROOM

PRESS RELEASES AND STATEMENTS

Ohio STEM Learning Network Receives Investment to Launch Science, Technology, Engineering, and Mathematics Initiative

Bill & Melinda Gates Foundation to help support statewide collaboration, providing more than 100,000 Ohio students with a 21st century education

4 schools

2006

2008

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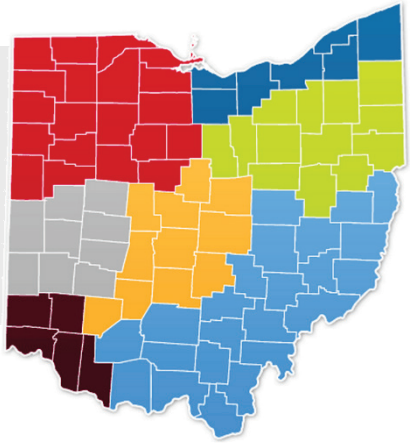
Education at Battelle

$10 million from the State of Ohio to grow and sustain the network



Regional STEM & 11 schools

2006 2008 2009

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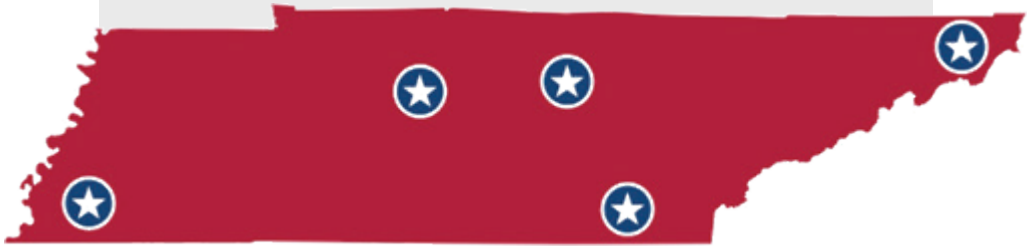
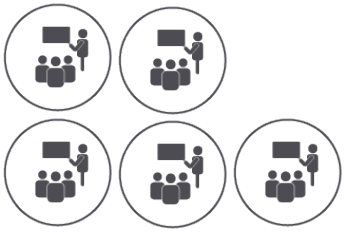
Education at Battelle

Under a second $13 million federal Race to the Top grant, Battelle starts with Tennessee network with 5 new schools



5 new schools



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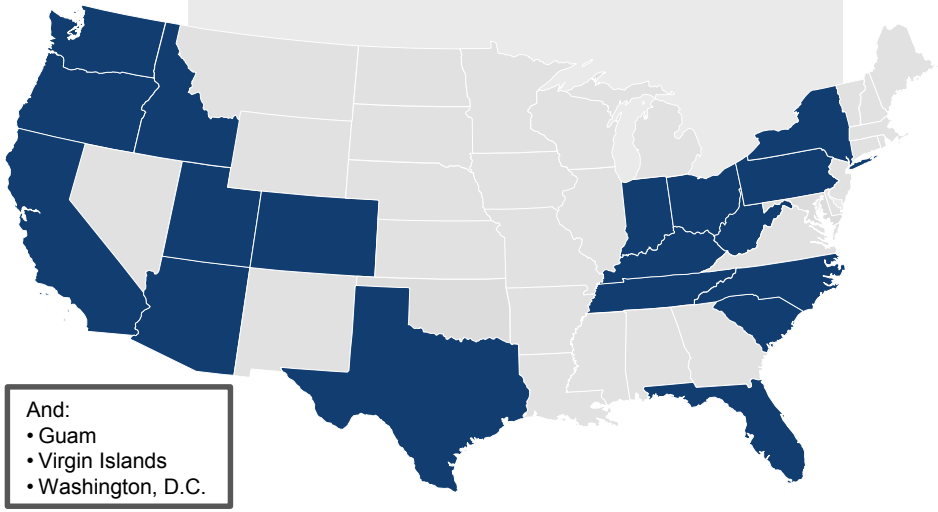
Education at Battelle

Battelle and other states founded national STEMx network, today counting 21 states/territories as members



And:
- Guam
- Virgin Islands
- Washington, D.C.

2006 2008 2009 2010 2012

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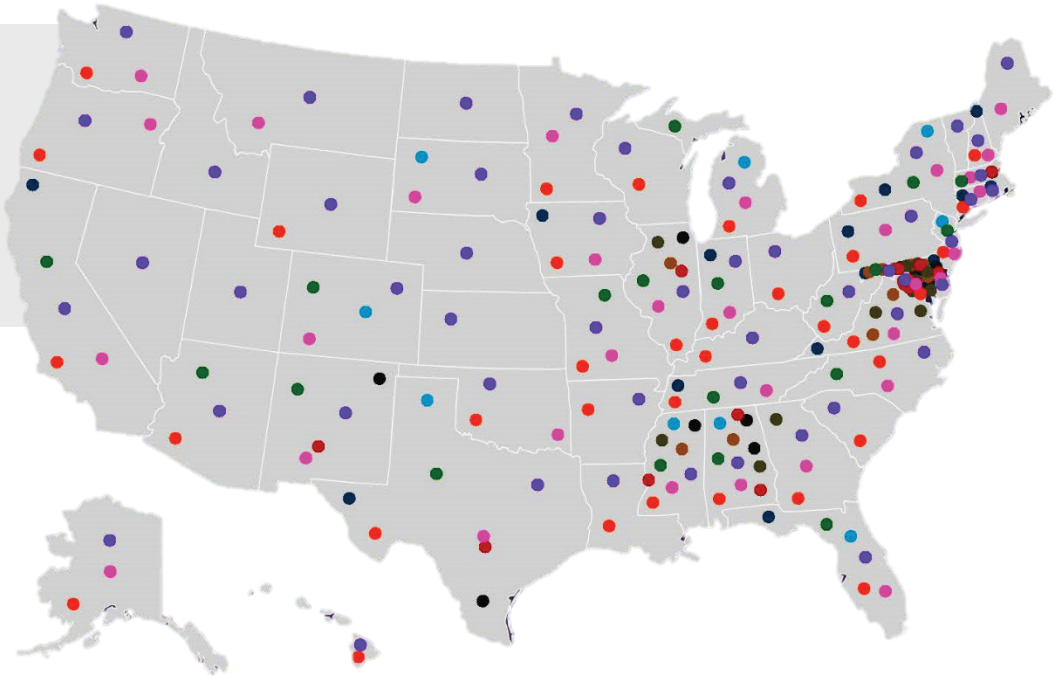
Education at Battelle

Battelle-led consortium wins $185 million, 10 year award to manage Army Educational Outreach Programs (AEOP)



2006 2008 2009 2010 2012 2015

BATTELLE

Ronny Now

"Looking back, I have Metro to thank for helping me understand the opportunities and my potential to have a footprint in global market."

"Every day there's a new lesson to be taught and a subject to master, I just show up ready to learn."

How does this translate to a rural context?

Rural Literacy Design Collaborative

Connecting educators with Battelle teaching practices and STEM professionals

BATTELLE

Structure

BATTELLE

- Teaching method and coaching lead

HIGH SCHOOLS THAT WORK

- In-classroom support

THE PAST FOUNDATION

- Evaluation to support State of Ohio grant

RURAL LITERACY DESIGN COLLABORATIVE

LDC Module: There's No Place Like Home

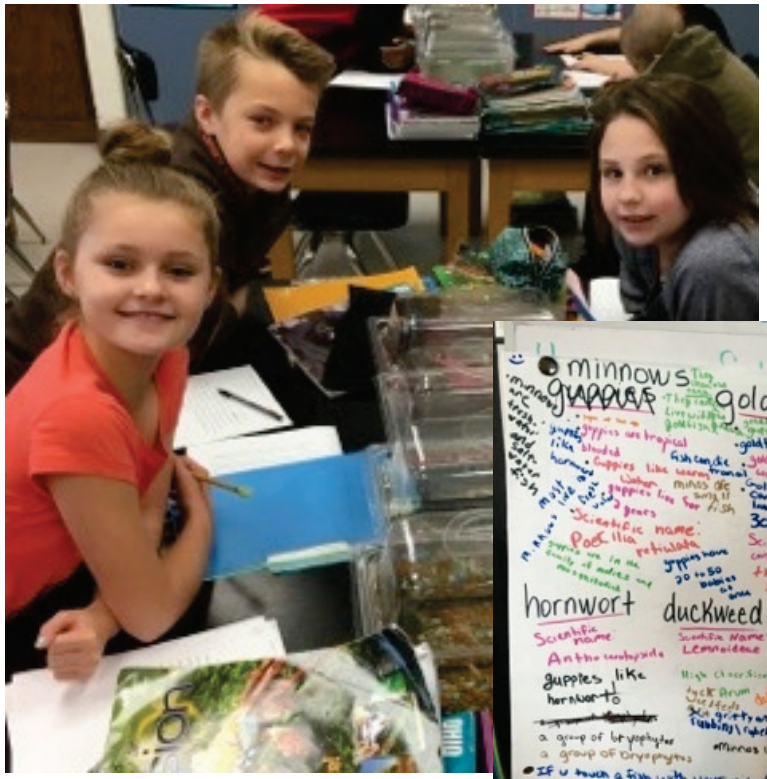
How can we most effectively create an aquatic ecosystem that sustains 5 out of 15 species for a period of 30 days?

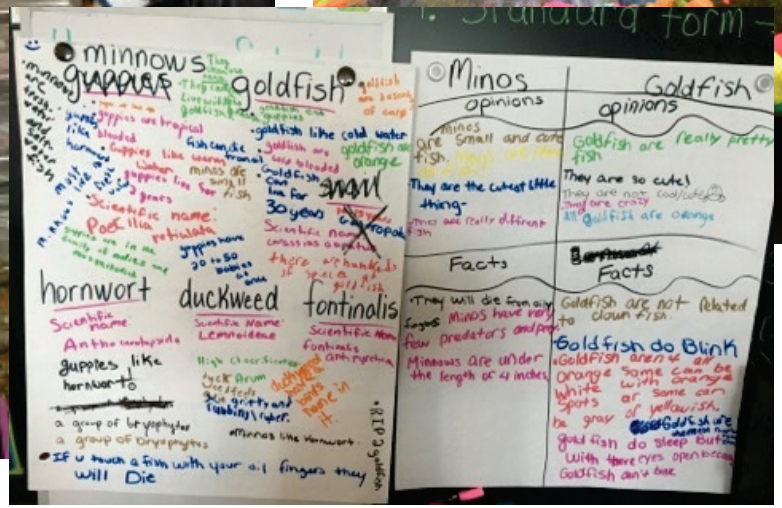
After reading an RFP from a local pet store, conducting background research on ecosystems, and designing and testing a habitat, write a design report in which you describe your design and argue its effectiveness in meeting the requirements of the RFP. Support your response with evidence from your research.

RURAL LITERACY DESIGN COLLABORATIVE

Black River Michele Yocum, 5th Grade Science

LDC Module: There's No Place Like Home





RURAL LITERACY DESIGN COLLABORATIVE

BATTELLE

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It can be done

800.201.2011 | solutions@battelle.org | www.battelle.org

The STEM Mobile Initiative

Sally Pardue, Ph.D.
Director of the Millard Oakley STEM Center
Tennessee Tech University

REL MIDWEST
Regional Educational Laboratory
at American Institutes for Research

Upper Cumberland Rural STEM Initiative (UCRSI)

Tennessee STEM Innovation Network & TTU Oakley STEM Center

TENNESSEE TECH UNIVERSITY

UCRSI

tsin Tennessee STEM Innovation Network

OAKLEY STEM CENTER

Challenge

How do we design ways to support learning in the Upper Cumberland as an example of "**Sustainable Rural STEM Education**"?

Upper Cumberland Rural STEM Initiative: The Numbers

People

- **10,000+** regional TN students in grades preK-8
- **40** Hub Teachers, **20** Hub Principals, **20** Supervisors of Instruction and **20** Directors of Schools actively networking
- **35** Platform Teachers and **2** Principals – (Prescott South Elementary and Middle Schools, Putnam County)
- **10** Team Oakley staff and other personnel from TTU
- **15+** partner representatives

Upper Cumberland Rural STEM Initiative: The Numbers

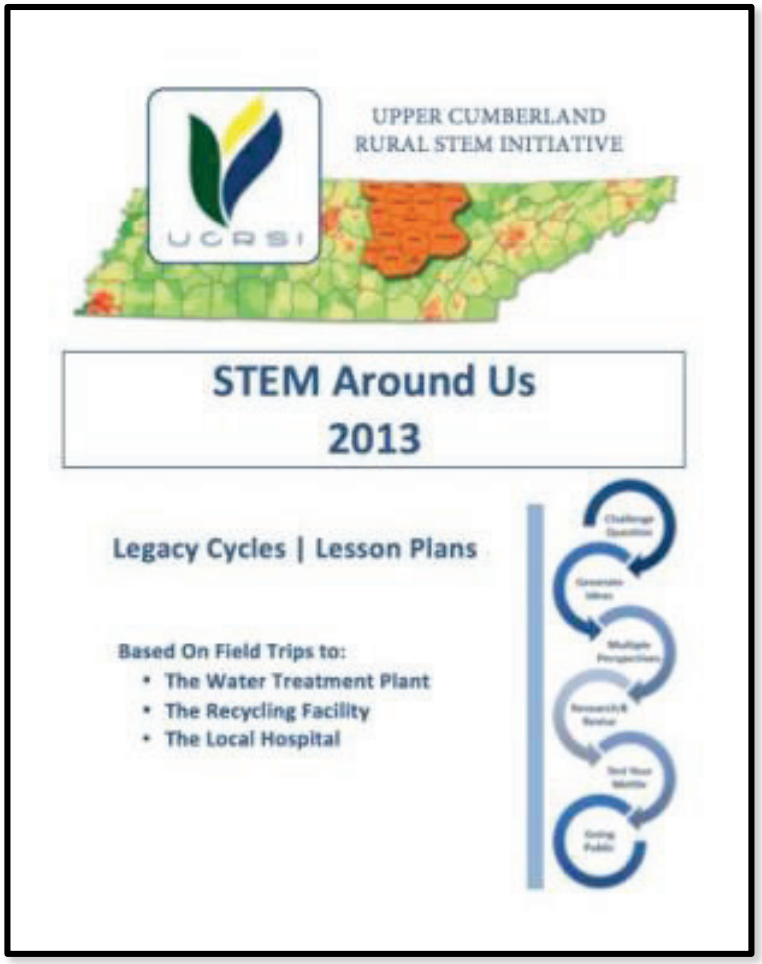
Dollars

- **$475,000** federal dollars invested via TSIN over 21 months (Aug 2012 – April 2014) with **impacts designed to last** through 8 project outcomes
- **$100,000** TN dollars invested in STEMmobile
- **$250,000** TTU dollars invested in STEMmobile
- Partner LEAs each investing **$1,000** for 2013/2014 STEMmobile route

STEM Modules

Text and image collections, videos, PowerPoints, sample results, peer reviews, discussion boards, & blogs

iPad Apps and Lesson Plans



STEMmobile

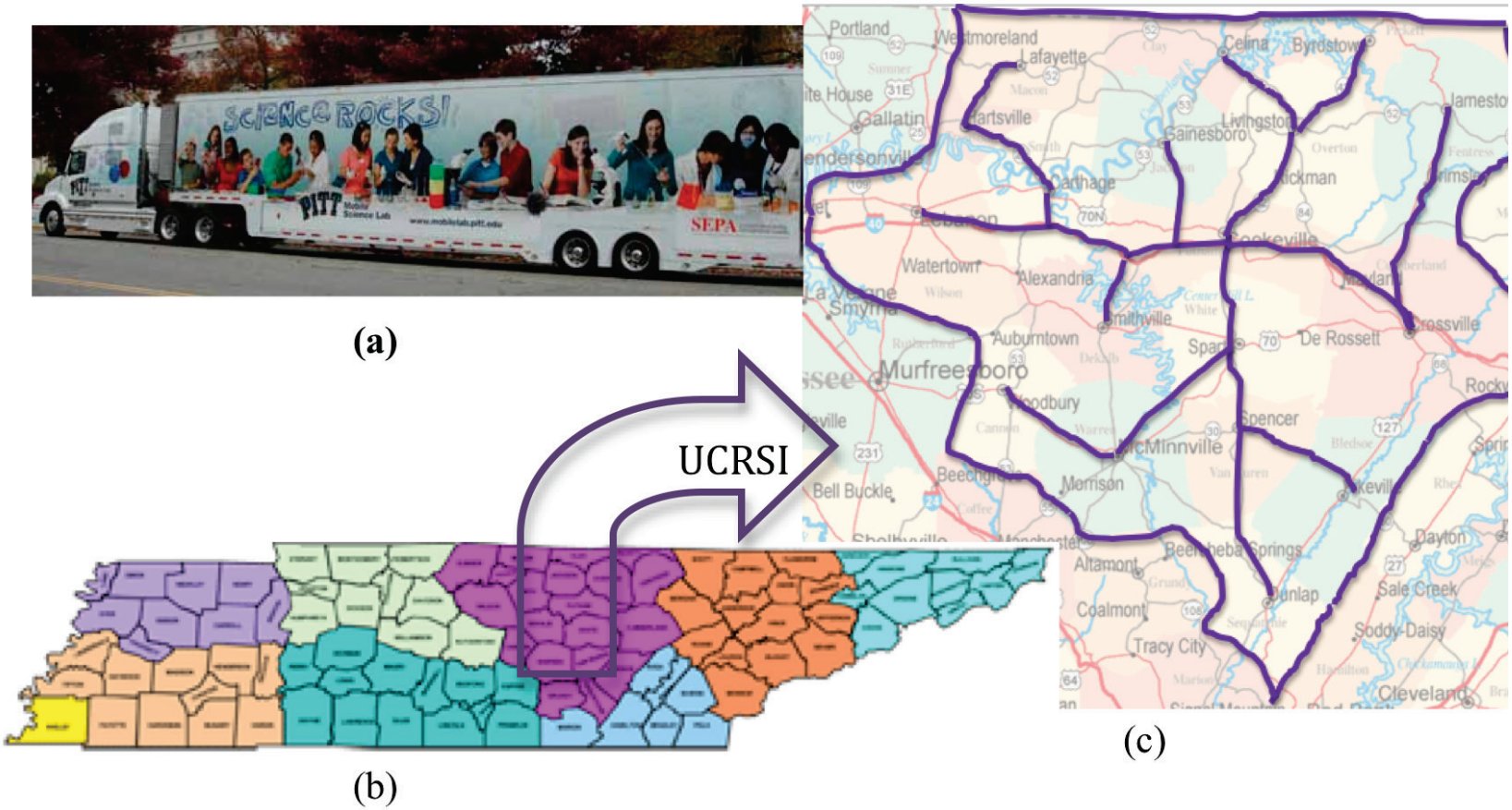
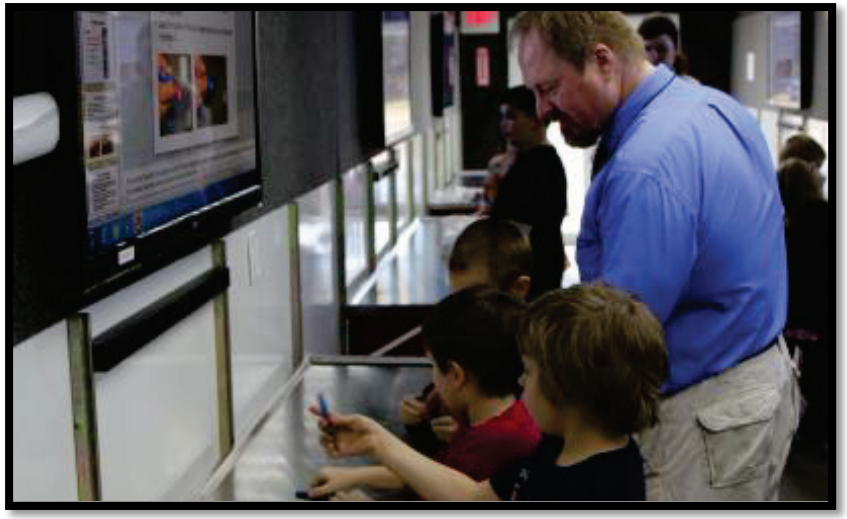


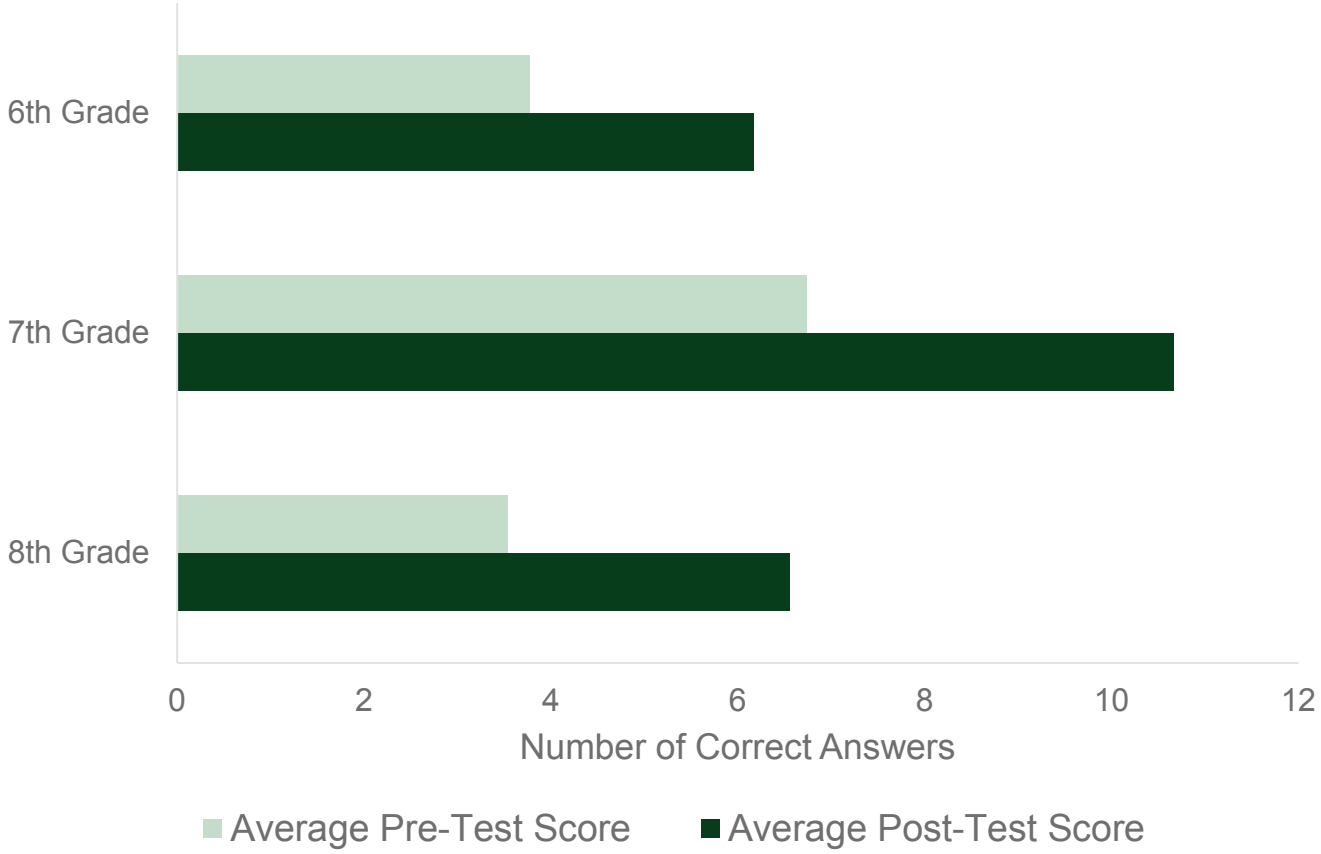
Figure 1. (a) Concept image of UCRSI STEMmobile[59]. (b) TN Dept of Education Field Service Areas[60]. (c) UCRSI partner region shown as expanded map[61] with road routes draw in for STEMmobile.

Early “STEM” mobile in 1943

21st Century STEMmobile



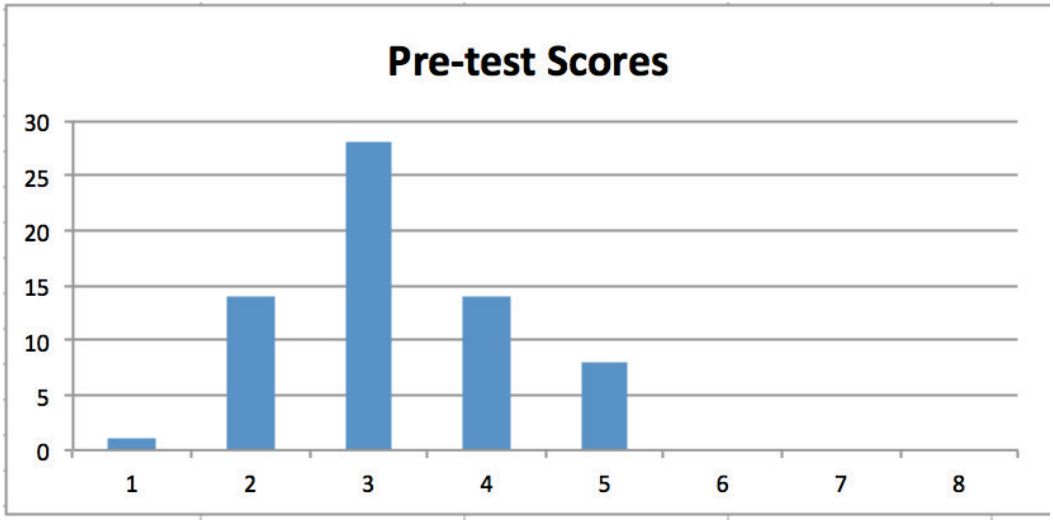
How do we know STEMmobile is working?

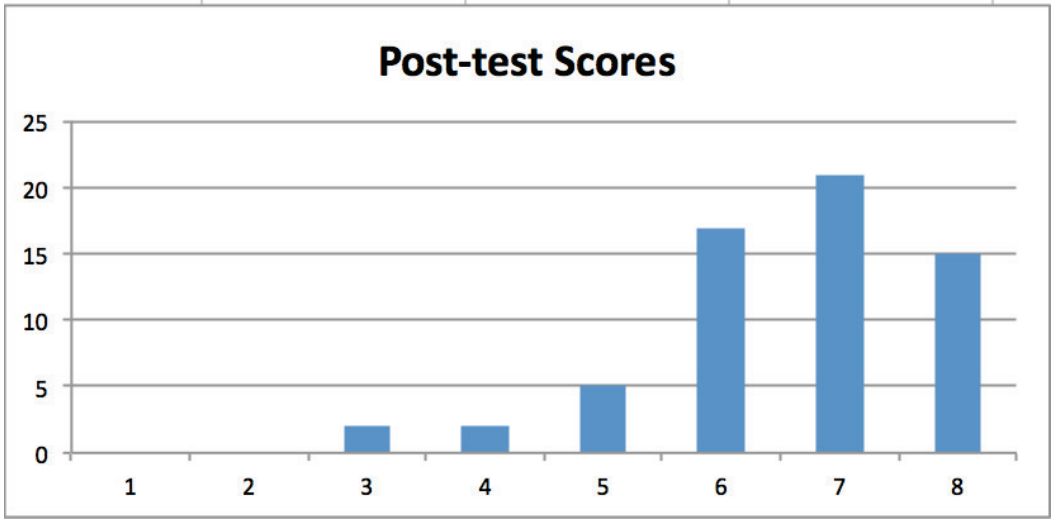


How do we know STEMmobile is working?

Total number of Matched Pairs	**469**	
6th Grade Average Pretest	3.77	47%
6th Grade Average Posttest	6.17	77%
AIP - Avergage Improvement Percentage	30%	
Total number of Matched Pairs	**312**	
7th Grade Average Pretest	6.74	56%
7th Grade Average Posttesst	10.66	89%
AIP	33%	
Total number of Matched Pairs	**197**	
8th Grade Average Pretest	3.54	44%
8th Grade Average Posttest	6.55	82%
AIP	38%	
Total number of Matched Pairs (6th, 7th and 8th)		**978**

How do we know STEMmobile is working?





STEM Career Pathways

- Family Engagement Evenings
- FAB Fridays
- Career Fairs

STEM Career Pathways

- STEM Career videos with Business Media Center, 11 posted
- UCRSI partners with Highlands Initiative and “Pathways to Prosperity”
- 2012, 2013, 2014 8th grade Career Fair

https://www.youtube.com/user/OakleySTEMCenter

UCRSI Career Engagement

UCRSI Career Engagement videos aim to give students & teachers a glimpse inside the everyday work environment of local STEM professionals. Each video is carefully produced in order to best capture the use of… Common Core Standards in each of the selected individuals' job functions.

Meal Planning to Control Disease Processes

by **OakleySTEMCenter** • 5 months ago • 23 views

Lora Simpson, a Registered Dietitian, tells us how she uses meal planning in her job to support patients with diabetes. …

How Electricity Gets Inside Your House

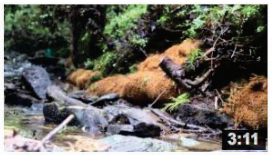
by **OakleySTEMCenter** • 5 months ago • 91 views

David Gentry of M&D Electric takes you through the process of how electricity moves from the transformer to inside your home.…

Force Formula with the THP Roll Car

by **OakleySTEMCenter** • 5 months ago • 79 views

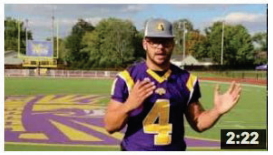
Captain RC Christian of the Tennessee Highway Patrol explains the types of forces involved in a car crash in a practical demonstration using the roll car.…



On Location: Stream Restoration

by **OakleySTEMCenter** • 5 months ago • 40 views

Dennis Gregg, Director of the Obed Watershed, takes us on site in Cumberland Mountain State Park to give us a special tour of an ongoing stream restoratio…



The Effect of Heart Rate on Athletic Performance

by **OakleySTEMCenter** • 5 months ago • 60 views

Coty Forbes, runningback for the TTU Golden Eagles, takes you through a typical practice and the importance of heart rate on athletic performance. …

From Wastewater to Clean Water

by **OakleySTEMCenter** • 5 months ago • 55 views

John Beuford, Assistant Wastewater Plant Superintendent at the Water Center in Cookeville, TN explains how they treat wastewater to provide clean water f…

UCRSI Volunteer Corp

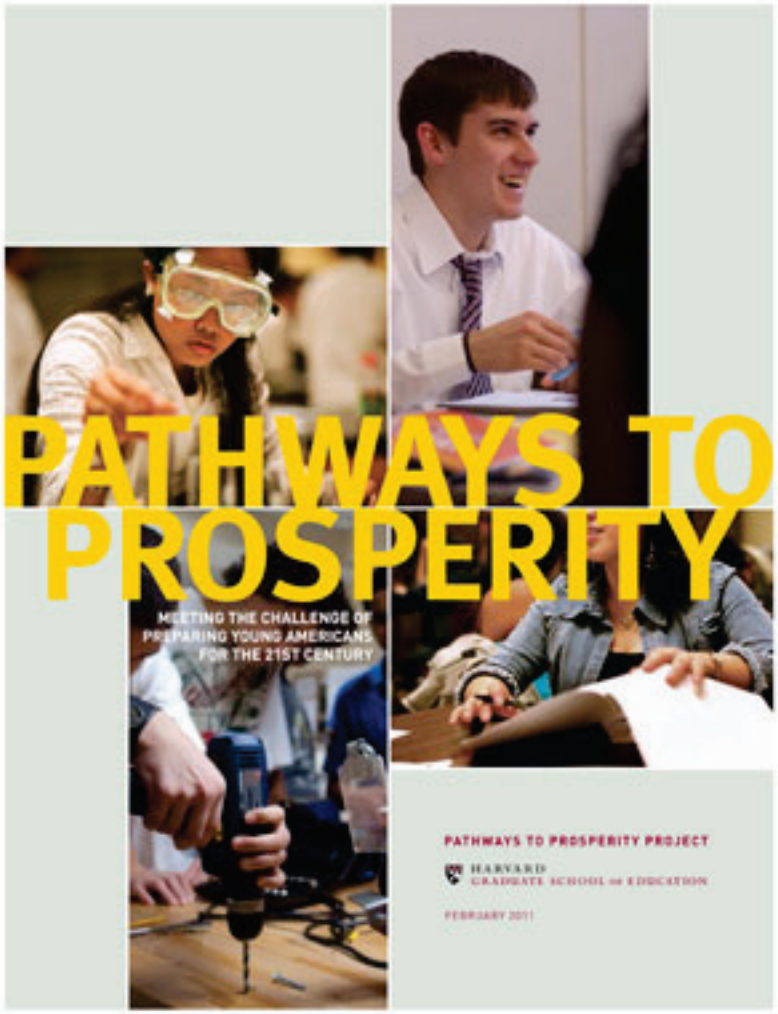
Online training prepares STEM professionals to be effective in their outreach to STEM learners.

STEM Classroom Mini-Grants

Mini-grants awarded to teachers from the LEA partners to enhance STEM instruction

Pathways to Prosperity Opportunity

- Harvard Graduate School of Education Report- *Pathways to Prosperity*
- States asked to join
  - TN becomes a member
  - Invites SE and UC to join
  - UC begins with 4 Counties: Jackson, Overton, Putnam and White
  - Adds Clay and Warren this year and future expectation to add other UC Counties



Upper Cumberland *Pathways to Prosperity*

Mission: provide students in grades 7-14/16 *access* to rigorous academic/career pathways, which are **interlinked** with local, regional, and state economic/labor market needs and trends in order to **develop and promote a workforce** that is educated and skilled in their chosen fields.

Pathways Purpose

- Prepare youth for 21st Century jobs in the region, state and nation
- Ensure more young people earn some form of post-secondary credential
- Meet the workforce needs of existing and new industry

Learn and Earn Model Partnership (Corporate Voices for Working Families, 2012)

Expanding the Work

Alignment of Stakeholders

- Employers
- Community Leaders
- Educators

New Opportunities Emerge

- 2015 Perkins Reserve Grant: Clay and Warren Counties Add Coaches and Clay Purchases Mechatronics Equipment
- LEAP Grant (Labor Education Aligned Program)
- UC Talent Development Roundtable Committee
- TN Reconnect Community Grant

What's Next?

Add

- Other UC Counties to the Workforce Development & Education Teams

Review

- Labor Market Data Annually

Establish

- New Pathways to match regional jobs
- Align Industry Needs with Education

Maintain

- A pulse on existing industry needs and emerging technologies

Continue

- Pipeline of skilled labor to meet the needs of existing and new industry

Expand

- Stakeholder engagement for greater alignment

Question & Answer Session

Haidee Williams, Ph.D.

Senior Technical Assistance Consultant, American Institutes for Research

David Burns

Director of STEM Learning Networks, Battelle Education

Kelly Gaier Evans

STEM Relationship Manager, Battelle Education

Sally Pardue, Ph.D.

Director of the Millard Oakley STEM Center, Tennessee Tech University

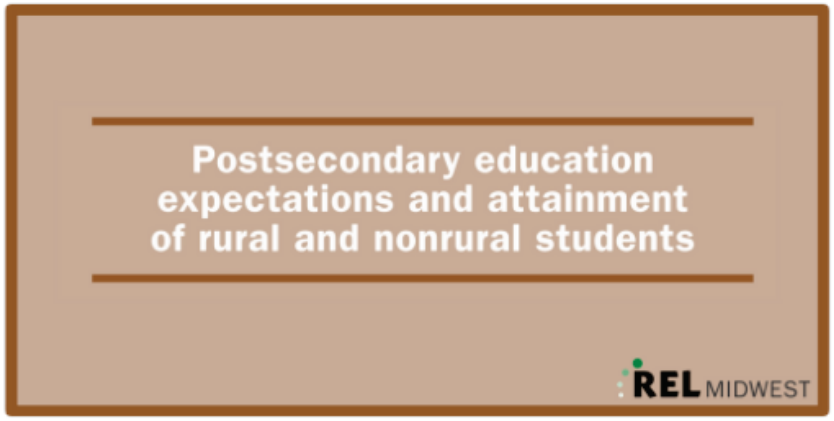
Follow us on Twitter and visit our website for resources and news!

@RELMidwest

https://ies.ed.gov/ncee/edlabs/regions/midwest/default.aspx

TWEETS 2,384 | FOLLOWING 195 | FOLLOWERS 1,631 | LIKES 187 | LISTS 1 | Follow

RELMidwest @RELMidwest · Apr 30
What happens after high school for #rural and nonrural students? Our researchers explored #postsecondary journeys: ies.ed.gov/ncee/edlabs/pr...



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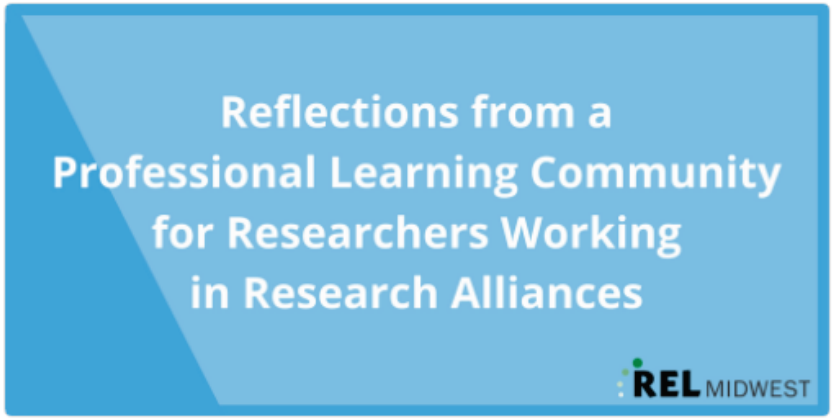
RELMidwest @RELMidwest · Apr 29
Through a PLC, researchers can share strategies to collaborate and encourage #eddata use among practitioners: ies.ed.gov/ncee/edlabs/pr...



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RELMidwest @RELMidwest · Apr 28
This quick video makes understanding our work REL-atively easy:

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David Burns:
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Kelly Gaier Evans:
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Sally Pardue:
spardue@tntech.edu

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