Student Success in Mathematics Partnership Meeting

September 23, 2020

Pam Buffington
Partnership Lead

Ryoko Yamaguchi
Research Lead

Laura Kassner
Partnership Liaison

Jill DePiper
Partnership Staff

IES Institute of Education Sciences

REL Appalachia at SRI International

Agenda

- Welcome and updates
- Applying research-based mathematics teaching practices to a virtual environment
- Implementing cohesive professional development
- Next steps

Welcome and Updates

Laura Kassner
Partnership liaison

Ryoko Yamaguchi
Research lead

Student Success in Mathematics partnership: REL AP staff

Pam Buffington
Partnership Lead

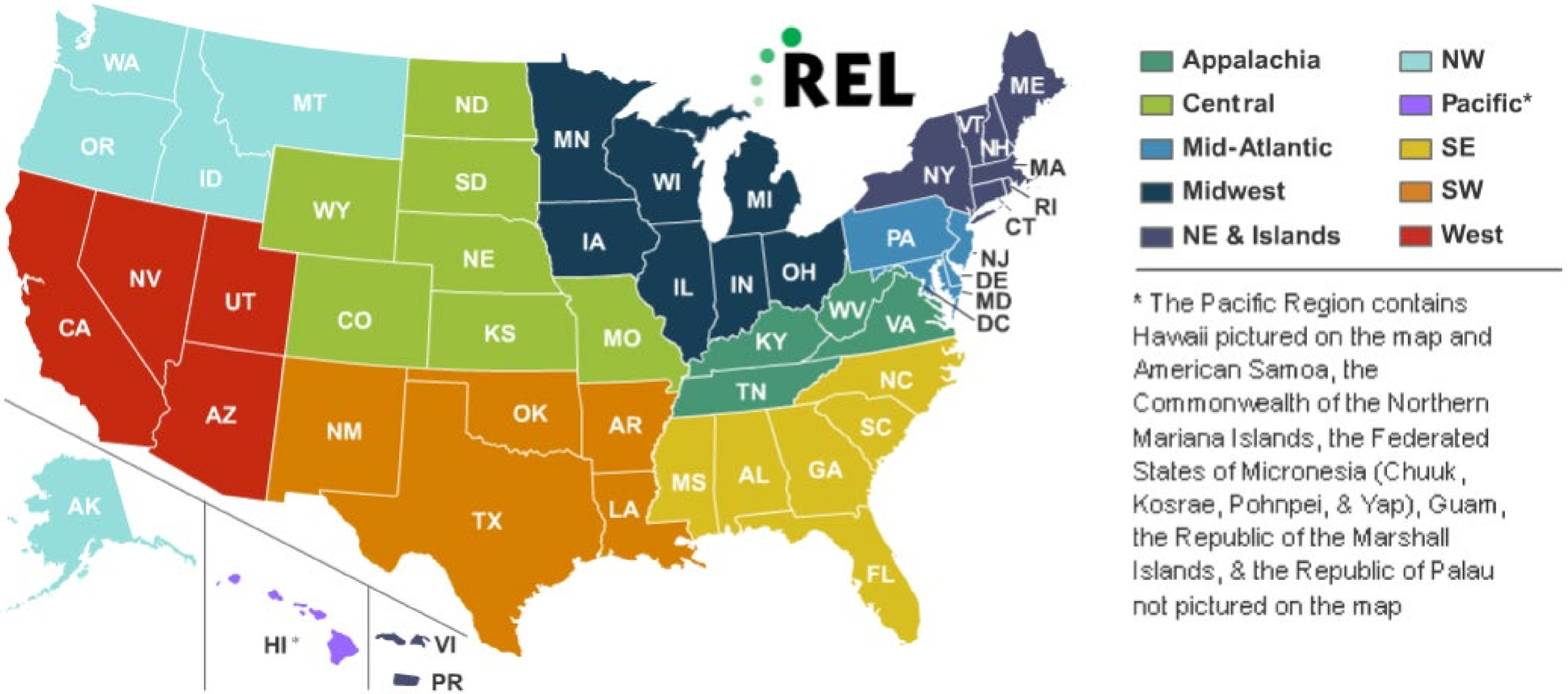
Ryoko Yamaguchi
Research Lead

Jill Neumayer DePiper
Partnership Staff

Laura Kassner
Partnership Liaison

Anna Chiang
Partnership Liaison

The Regional Educational Laboratories

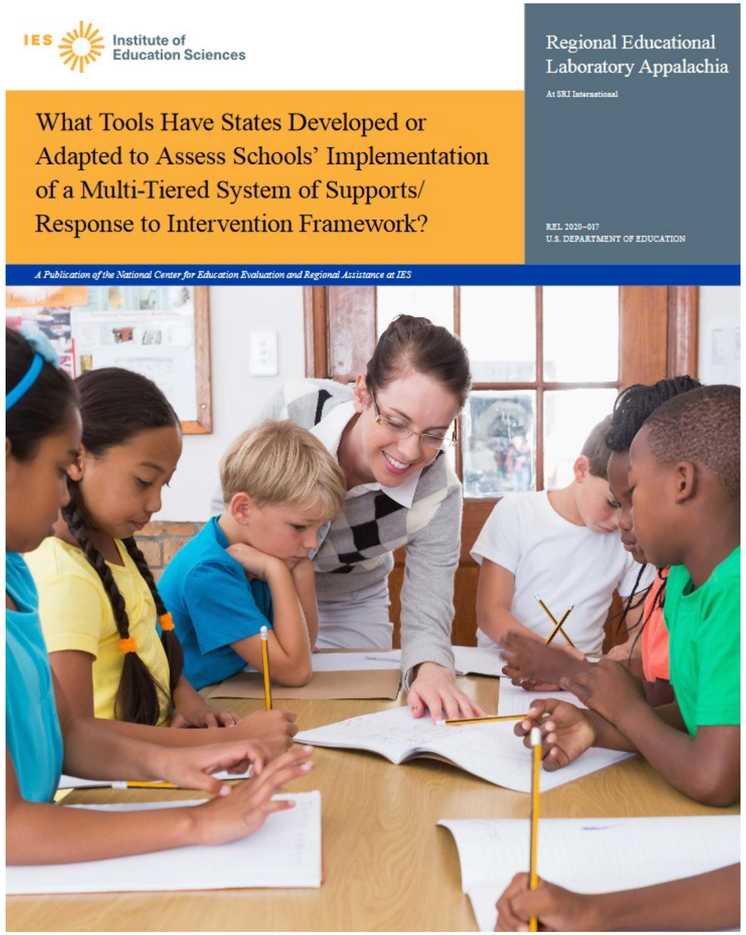


The **10 RELs** work in partnership with stakeholders to **support a more evidence-based education system.**

Administered by the U.S. Department of Education, Institute of Education Sciences (IES)

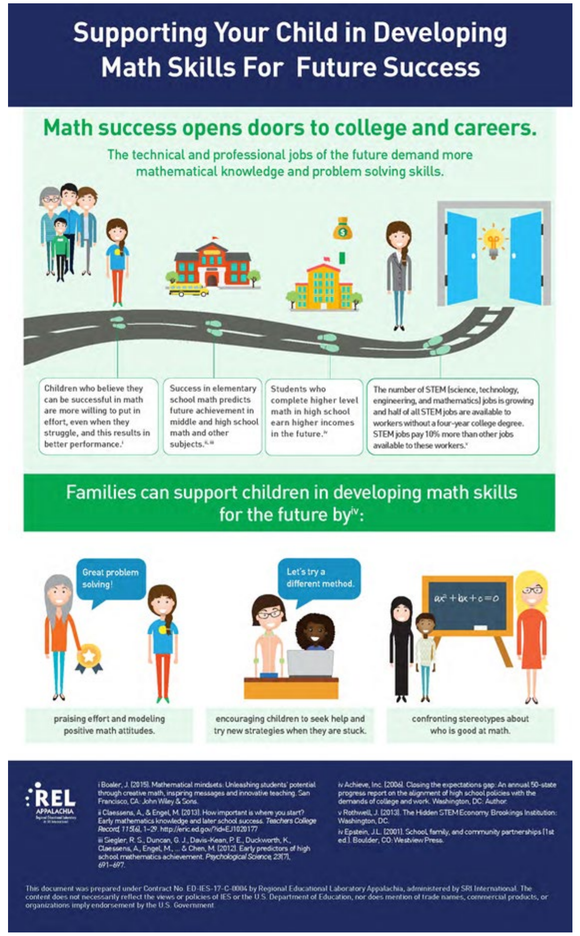
Find us on the web! **https://ies.ed.gov/ncee/edlabs/regions/appalachia/**

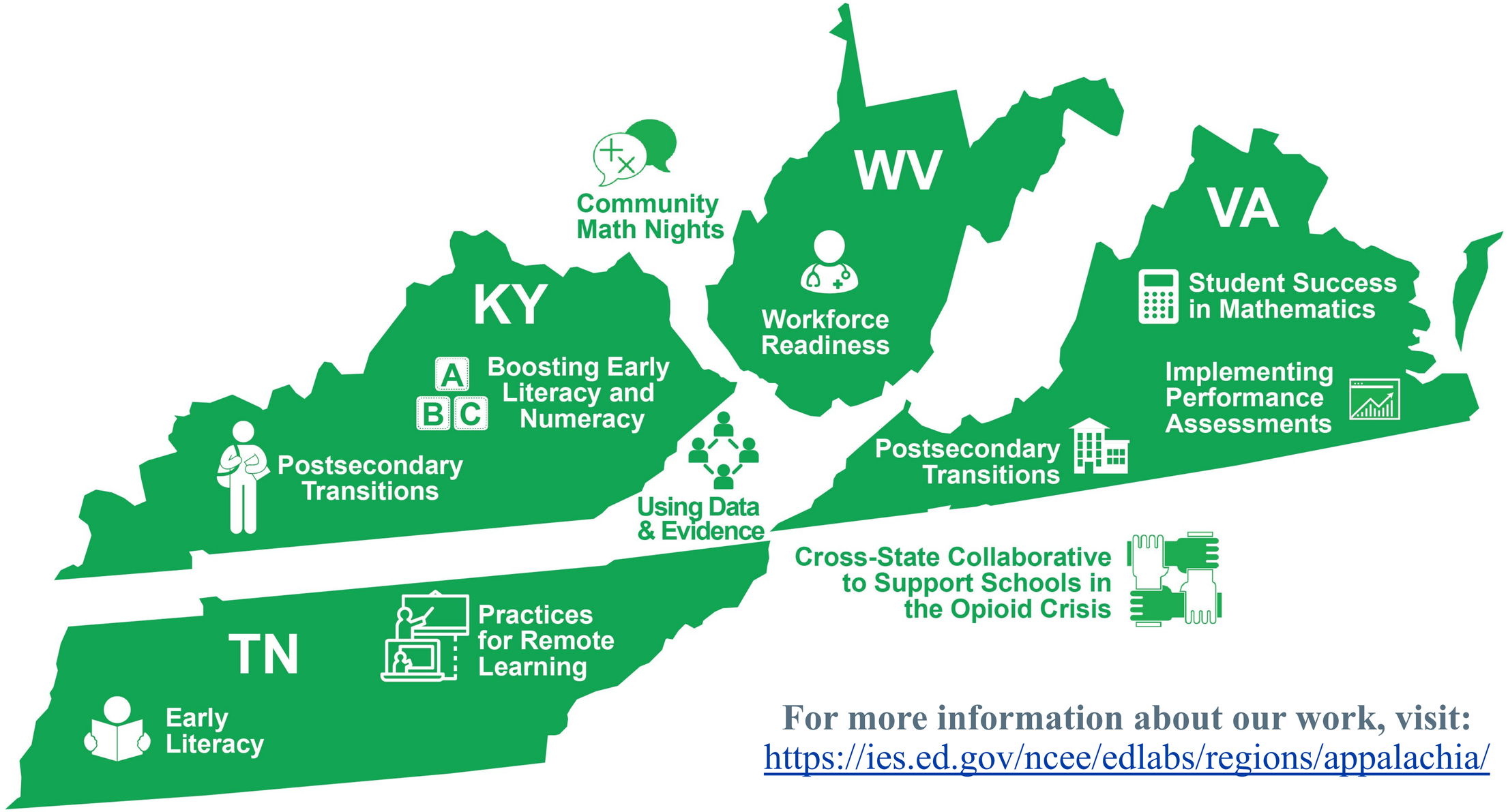
Applied Research



Training, Coaching, and Technical Support

Dissemination





For more information about our work, visit:
https://ies.ed.gov/ncee/edlabs/regions/appalachia/

Project updates

- Grade 7 data analysis coaching project
- Infographic presenting findings from mathematics course-taking pathways study

1	2	3	4	5	6	7
Courses after Algebra I e.g., Geometry I/ AFDA	After Level 1 e.g., Algebra II	After Level 2 e.g., AlgII/ Trig	After Level 3 e.g., AlgIII/ Pre-calc/ Stats	After Level 4 e.g., Calc/ AP Calc AB	After Level 5 e.g., AP Calc BC	After Level 6 e.g., Advanced Calc

SCED CODE	COURSE NAME	SCED COURSE DESCRIPTION	LEVELING VERSION 3 (7.8.20)
2003	Particular Topics in Foundation Math (Math 9/10, Math 11/12)	These courses examine particular topics in **Foundation Mathematics**, such as arithmetic, sequences, or basic conceptual skills, rather than provide a general overview.	0
2049	Foundation Math - Other		0
2157	Consumer Math	**Consumer Mathematics** courses reinforce general mathematics topics (such as arithmetic using rational numbers, measurement, ratio and proportion, and basic statistics) and apply these skills to consumer problems and situations. Applications typically include budgeting, taxation, credit, banking services, insurance, buying and selling products and services, home and/or car ownership and rental, managing personal income, and investment.	0
2994	Mathematics Proficiency Development	**Mathematics Proficiency Development** courses are designed to assist students in acquiring the skills necessary to pass proficiency examinations.	0
52049	Foundation Math - Other		0
2074	Algebra I/Geometry	**Principles of Algebra and Geometry** courses combine the study	0

Applying Research-based Mathematics Teaching Practices to a Virtual Environment

Pam Buffington
Partnership Lead

What do we know about online and blended learning?

- Even as more students take online courses, the evidence of effectiveness is still limited and the results of two of the most methodologically rigorous studies show mixed results (U.S. Department of Education, Office of Planning, Evaluation, and Policy Development, 2010; Broderersen & Melluzzo, 2017).
- Students who engaged in their online course for two or more hours per week had better outcomes than students who engaged for fewer than two hours per week (Pazzaglia et al., 2016).
- Most prevalent use of online courses across K–12 is to provide students with courses for credit recovery (Andrie, 2012; Davis, 2011; Dessoff, 2009; Plummer, 2012).
- Florida high school students who were enrolled in credit recovery courses were more likely to earn a grade of C or better when taking an academic course online than when taking it face to face (Hughes et al., 2015).
- Another study focused on the effectiveness of online courses to expand course access found that offering online algebra I in grade 8 to algebra-ready students in schools that do not typically offer the course positively impacted students' algebra achievement and subsequent course taking (Heppen et al., 2011).

Online and blended learning during the COVID-19 pandemic

- Published resource: *Teaching, Technology, and Teacher Education during the COVID-19 Pandemic: Stories from the Field* (Ferdig et al., 2020)
  - Open access eBook contains 133 chapters with over 850 pages documenting lessons learned, strategies, and efforts by teacher educators, professional developers, researchers, and practitioners during the COVID-19 pandemic. Contains specific details about mathematics teaching and learning in this context.
  - https://www.learntechlib.org/p/216903/
- What else have you learned?
  - Share one online or remote learning strategy implemented in your school division to support mathematics learning and teaching in the spring of 2020.

REL resources related to online and blended learning

- REL Appalachia Summary of Verified Research Findings [Link]
  - Programs that rigorous evaluation shows have the potential to improve outcomes for participating students.
- REL Corner: Digital learning for students and educators [Link]
  - Learn about the REL Appalachia and its work, and dive into resources from across the REL program on online/digital learning and collaboration for supporting educators and students.
- Ask A REL response: "Could you provide information on how to coach instructors who are teaching online, including any measures or protocols?" [Link]

REL resources related to online and blended learning

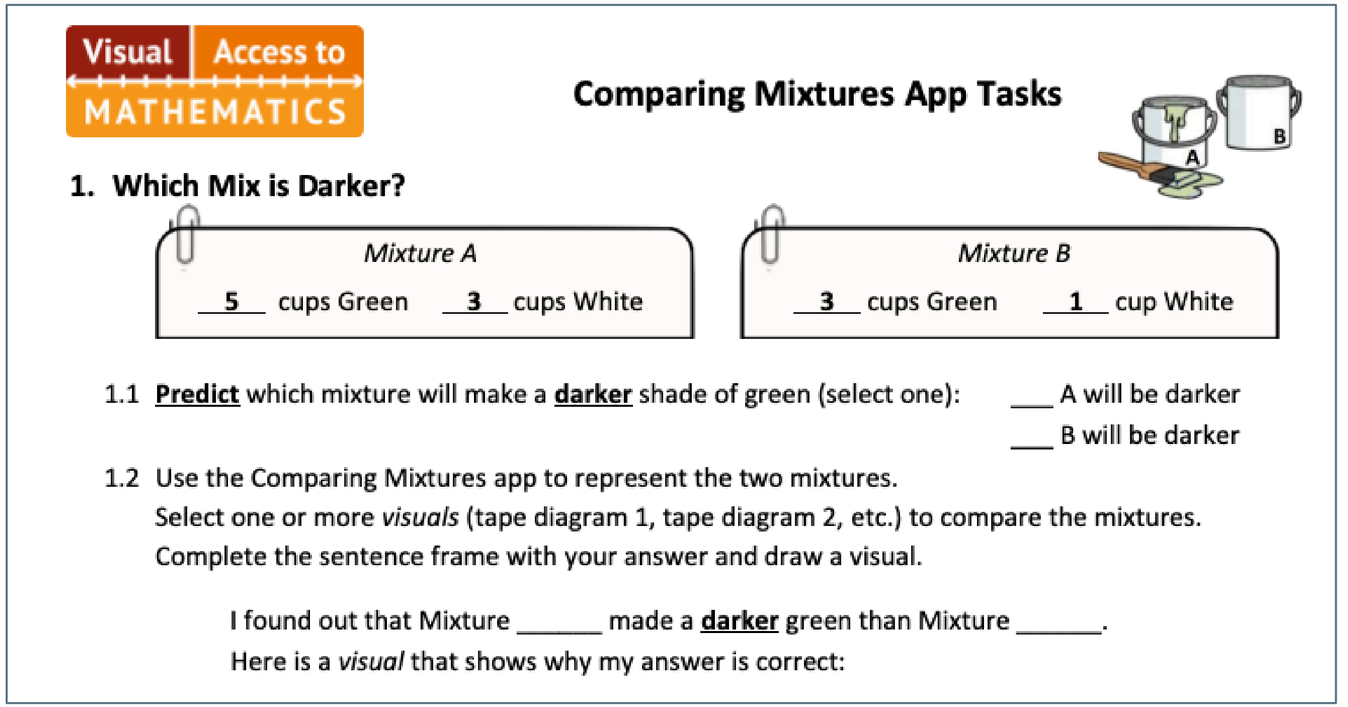
- Summary of research on online and blended learning programs that offer differentiated learning options [Link]
  - Describes the characteristics of the learning programs.
  - Most examined programs used blended learning strategies; all the examined programs offered opportunities to differentiate their content, difficulty level, or pacing.
- List of online course research and resources [Link]
  - Studies of student online course use and of teacher training related to online instruction.
  - Three videos about virtual education research and four archived webinars.
  - Seven infographics.

Promising strategies to apply in online and blended learning

- Use **rich, open-ended mathematical tasks** that are structured in a way to support interactions (NCTM, 2014).
  - Tasks with more than one path to a correct answer
  - Encourage participants to listen to and reflect on each other's solution strategies
- Increase the **opportunities for interaction** and offer multiple **ways to interact** (breakout rooms, emoticons, chat, etc.) (McBrien et al., 2009).
- Encourage all participants to **contribute to large group discussions through questioning** and **use of online interface features** (Slagter van Tryon & Bishop, 2009).
  - Instructor questions and observations
  - Whiteboard features for collaborative problem-solving
  - Participant input and interaction in chat window

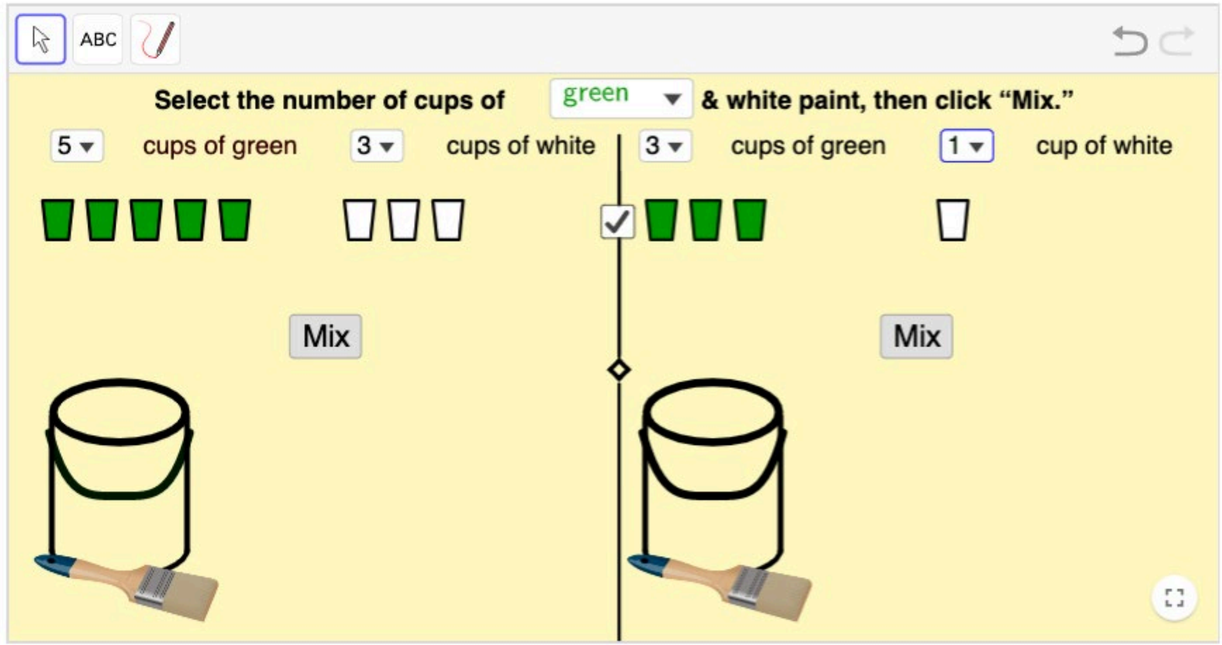
High-quality mathematics teaching and learning

- Engage in challenging tasks that involve meaning-making and support meaningful learning.
- Add interactivity, such as GeoGebra apps.



High-quality mathematics teaching and learning: Illustrative examples in an online environment

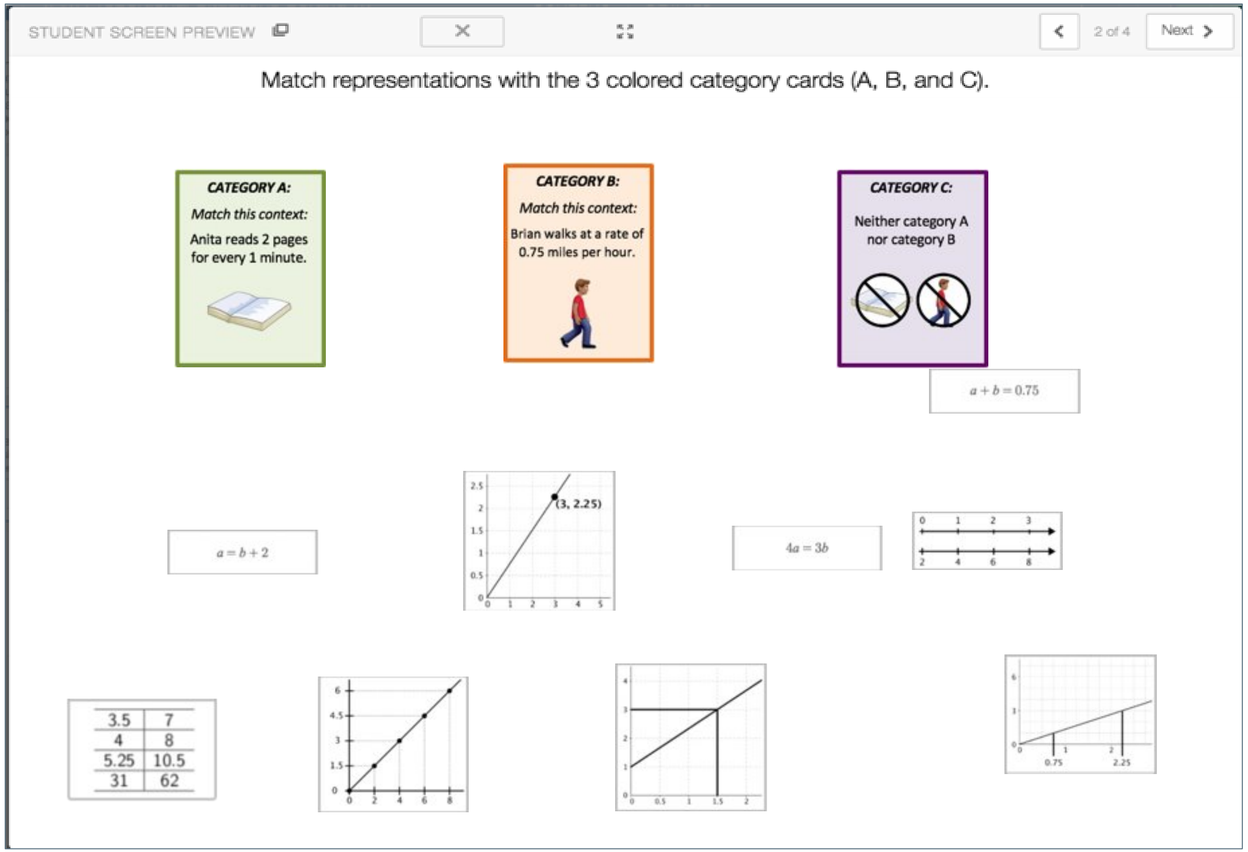
- Which mix is darker?
  5 green : 3 white OR 3 green : 1 white
- Mixing Paint Applet



Comparing Mixtures App task © 2017 Education Development Center, Inc. Image used with permission

Desmos card sorts for interactivity and student exploration

- Full group or in breakout groups
- Screen sharing or individual logins
- Multiple representations

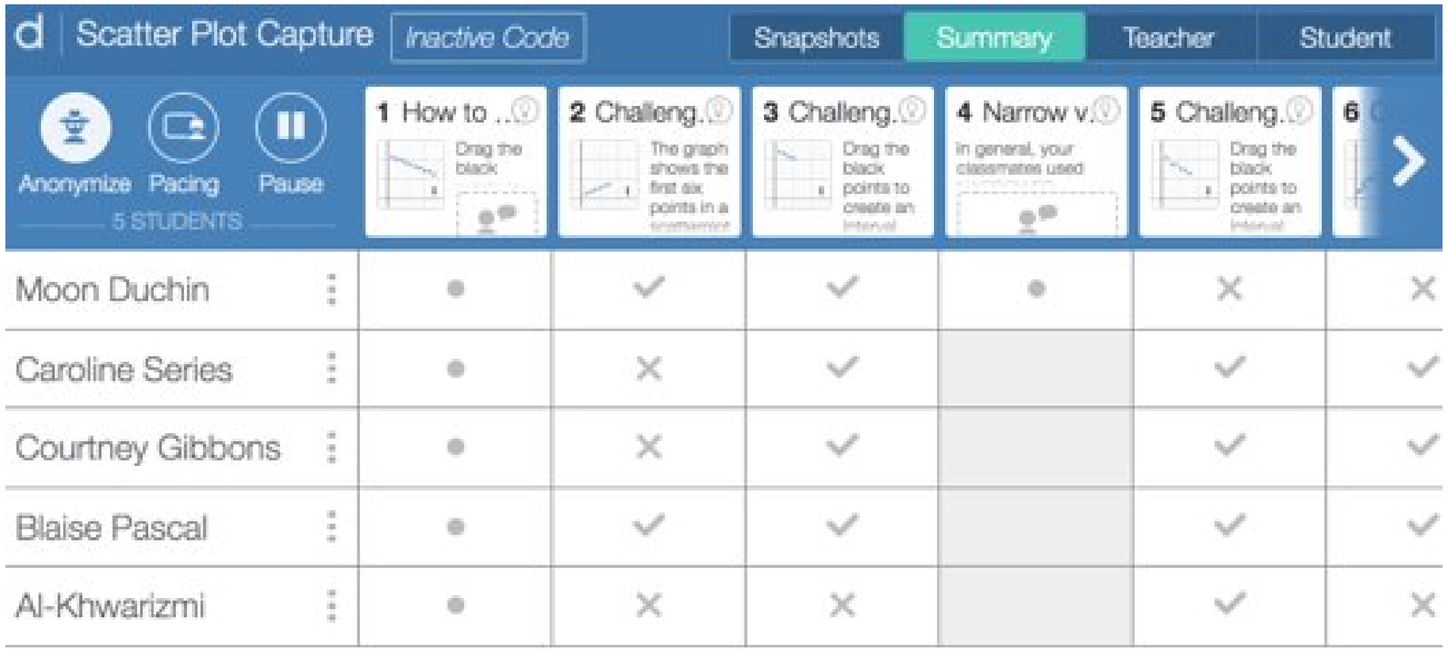


Reference to any specific commercial product, process, or service, or the use of any trade, firm or corporation name is for the information and convenience of the public, and does not constitute endorsement, recommendation, or favoring by the U.S. Department of Education.

Desmos teacher dashboard for formative assessment

Teachers have capability to:

- Monitor progress across stages of activities.
- Provide feedback to students in real time.
- Share and discuss different approaches with student names blinded.



Create account through **student.desmos.com** and provide students with a code

Reference to any specific commercial product, process, or service, or the use of any trade, firm or corporation name is for the information and convenience of the public, and does not constitute endorsement, recommendation, or favoring by the U.S. Department of Education.

Mathematical communication and representation

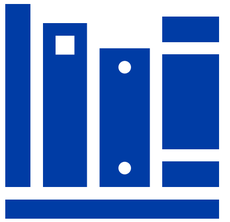
Strategy	Tool(s)
Use online tools to support reflection and sharing (individually and then with full group) Insert co-constructed word bank	Padlet, Nearpod collaborate board, Flipgrid, Google Docs, Google Slides
Collaboratively engage in discussion about content and approaches	Zoom breakout rooms, Google hangout
Assess understanding, formative assessment	Polling in Zoom, Zoom interactive whiteboard, Poll Everywhere, Poll Daddy
Create visual representations	Google Drawing, Google Slides, Zoom Interactive Whiteboard, Canva

Reference to any specific commercial product, process, or service, or the use of any trade, firm or corporation name is for the information and convenience of the public, and does not constitute endorsement, recommendation, or favoring by the U.S. Department of Education.

Implementing Cohesive Professional Development

Jill DePiper
Partnership Staff

Research-based professional development strategies



- Examining student work and thinking
- Demonstration lessons
- Action research
- Coaching
- Mentoring
- Study groups and Professional Learning Communities
- Workshops, institutes, and seminars

(Loucks-Horsley et al., 2010)

Strategies versus logistics

- Strategies for professional learning are not about the logistics—who is there, where it is, or the frequency—but they are about what activities happen during the time spent on professional learning.
- The strategies are actions that focus on specific mathematics teaching practices. The strategies fit into context, school culture, relationships, and logistics.
- Current logistics may influence how you implement strategies.

(Loucks-Horsley et al., 2010)

Plan strategies considering current logistics

- How can you model high-quality mathematics teaching and learning for teachers that they can then apply to their classrooms?
- What data will you need to examine to determine your next steps for teacher professional development? What are ways that you can collect data on teacher professional learning this fall?

Next Steps

Laura Kassner
Partnership liaison

Jill DePiper
Partnership Staff

Next steps

- Questions/concerns
- Next meeting:

  November 17, 9:00 a.m. – 12:00 p.m.

Contact us

REL Appalachia Student Success in Mathematics Partnership Team

Dr. Pamela J. Buffington pbuffington@edc.org

Dr. Ryoko Yamaguchi ryamaguchi@plusalpharesearch.com

Dr. Jill Neumayer DePiper jdepiper@edc.org

Dr. Laura Kassner laura.kassner@sri.com

Anna Chiang anna.chiang@sri.com

Contact us

https://ies.ed.gov/ncee/edlabs/regions/appalachia/

RELAppalachia@sri.com

@REL_Appalachia

References

Andrie, R. (2012). Credit recovery explained. *American School Board Journal, 199*(4), 32–33.

Brodersen, R. M., & Melluzzo, D. (2017). *Summary of research on online and blended learning programs that offer differentiated learning options* (REL 2017–228). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Central. http://ies.ed.gov/ncee/edlabs

Davis, M. (2011). Credit- recovery lessons. *Education Week, 30*(25), 30–32.

Dessoff, D. (2009). Reaching graduation with credit recovery. *District Administration, 45*(9), 43–48. http://eric.ed.gov/?&id=EJ860581

Ferdig, R.E., Baumgartner, E., Hartshorne, R., Kaplan-Rakowski, R. & Mouza, C. (2020). *Teaching, technology, and teacher education during the COVID-19 pandemic: Stories from the field*. Association for the Advancement of Computing in Education (AACE). https://www.learntechlib.org/p/216903/.

Heppen, J.B., Walters, K., Clements, M., Faria, A., Tobey, C., Sorensen, N., and Culp, K. (2012). Access to Algebra I: The Effects of Online Mathematics for Grade 8 Students. (NCEE 2012–4021). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education.

Hughes, J., Zhou, C., & Petscher, Y. (2015). *Comparing success rates for general and credit recovery courses online and face to face: Results for Florida high school courses* (REL 2015–095). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Southeast. http://ies.ed.gov/ncee/edlabs.

Loucks-Horsley, S., Stiles, K.E., Mundry, S., Love, N, & Hewson, P.W. (2010). *Designing professional development for teachers of science and mathematics.* Corwin.

McBrien, J. L., Jones, P. & Cheng, R. (2009). Virtual spaces: Employing a synchronous online classroom to facilitate student engagement in online learning. *International Review of Research in Open and Distance Learning, 10*(3), 1-17.

National Council of Teachers of Mathematics (NCTM). (2014). *Principles to actions: Ensuring mathematical success for all*. Author,

Pazzaglia, A. M., Clements, M., Lavigne, H. J., & Stafford, E. T. (2016). *An analysis of student engagement patterns and online course outcomes in Wisconsin* (REL 2016–147). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Midwest. http://ies.ed.gov/ncee/edlabs

Plummer, L. (2012). Assuring a virtual second chance. *THE Journal, 39*(2), 20–22.

Sitzmann, T., Kraiger, K., Stewert, D. & Wisher, R. (2006). The comparative effectiveness of web-based and classroom instruction: A meta-analysis. *Personnel Psychology. 59,* 623-664. 10.1111/j.1744-6570.2006.00049.x.

Slagter van Tryon, P. J. & Bishop, M. J. (2009). Theoretical foundations for enhancing social connectedness in online learning environments. *Distance Education, 30*(3), 291-315.

U.S. Department of Education, Office of Planning, Evaluation, and Policy Development. (2010). *Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies.* Washington, D.C.