Implementing a Professional Learning Model to Improve Mathematics Teaching

Webinar 1

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IES Institute of Education Sciences

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REL Appalachia at SRI International

Welcome

Laura Kassner
Partnership Liaison

Student Success in Mathematics partnership: REL Appalachia staff

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Partnership Lead

Ryoko Yamaguchi
Research Lead

Jill Neumayer DePiper
Partnership Staff

Laura Kassner
Partnership Liaison

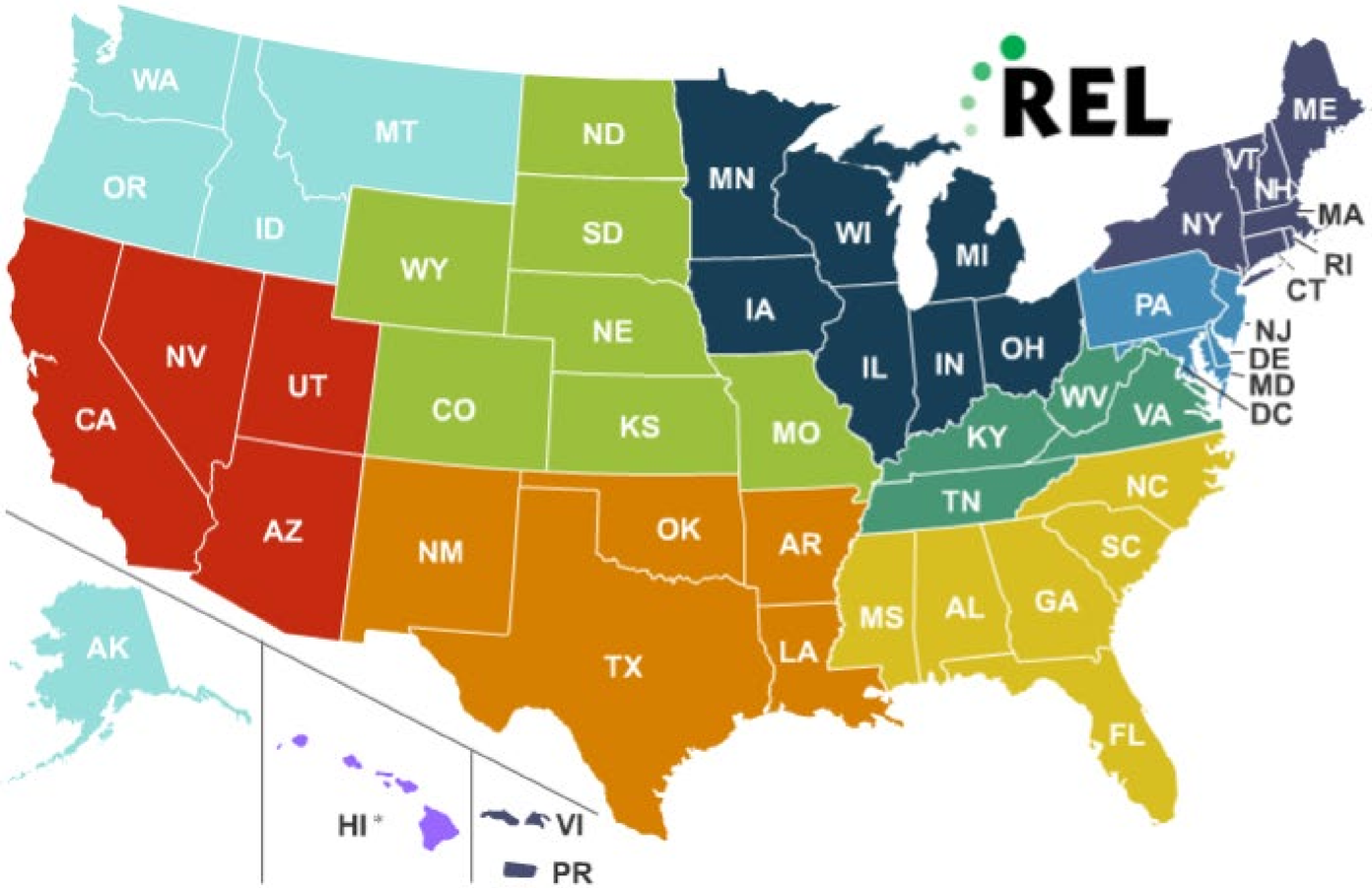
Anna Chiang
Partnership Liaison

Brian Nussbaum
Partnership Member

Agenda

- Welcome
- Overview and framing
- Professional learning models: Key components
- Professional learning models planning: Lessons from the field
- Closing

The Regional Educational Laboratories



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

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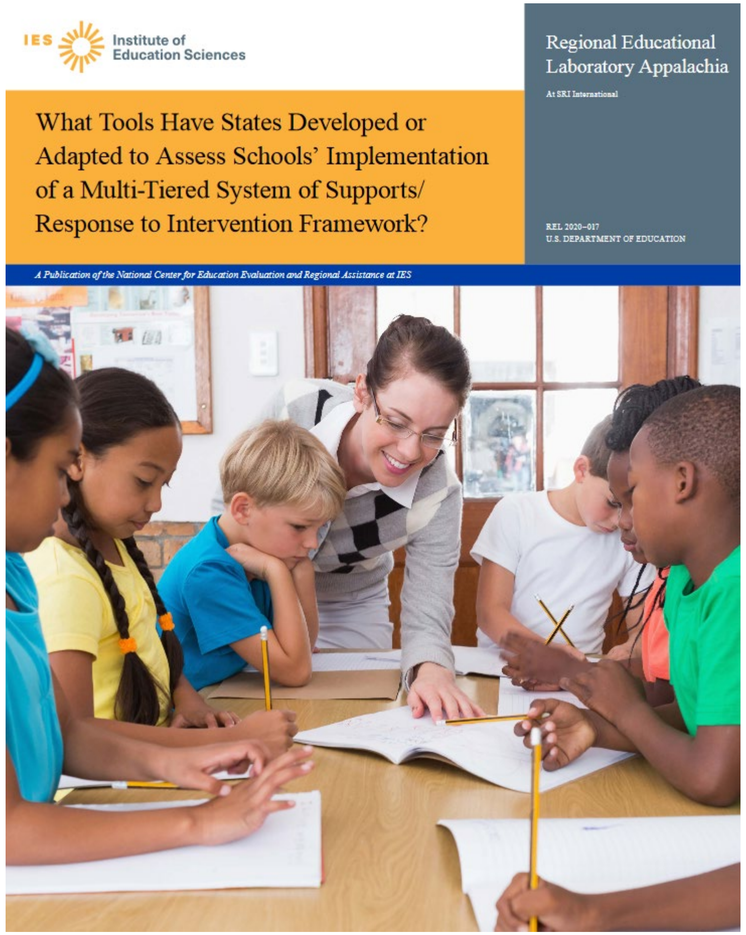
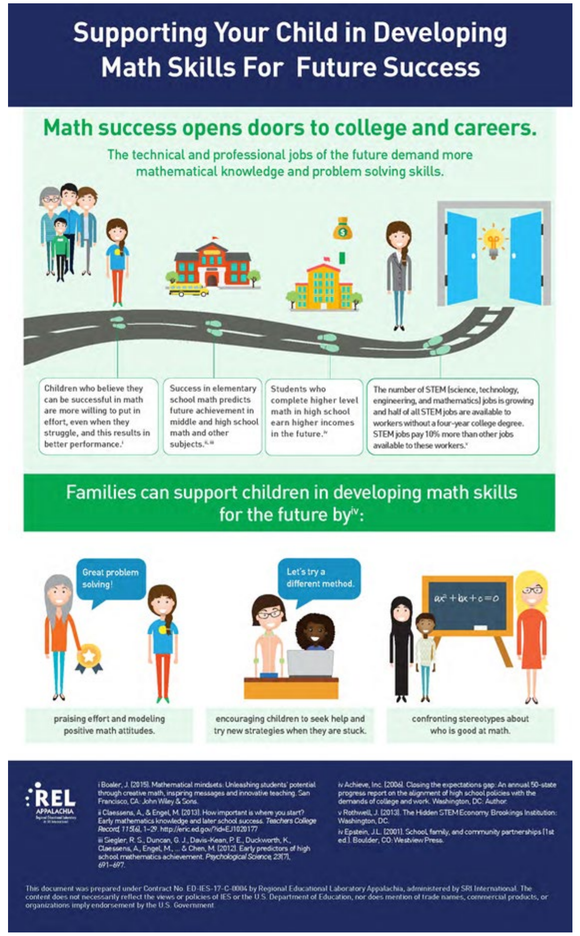
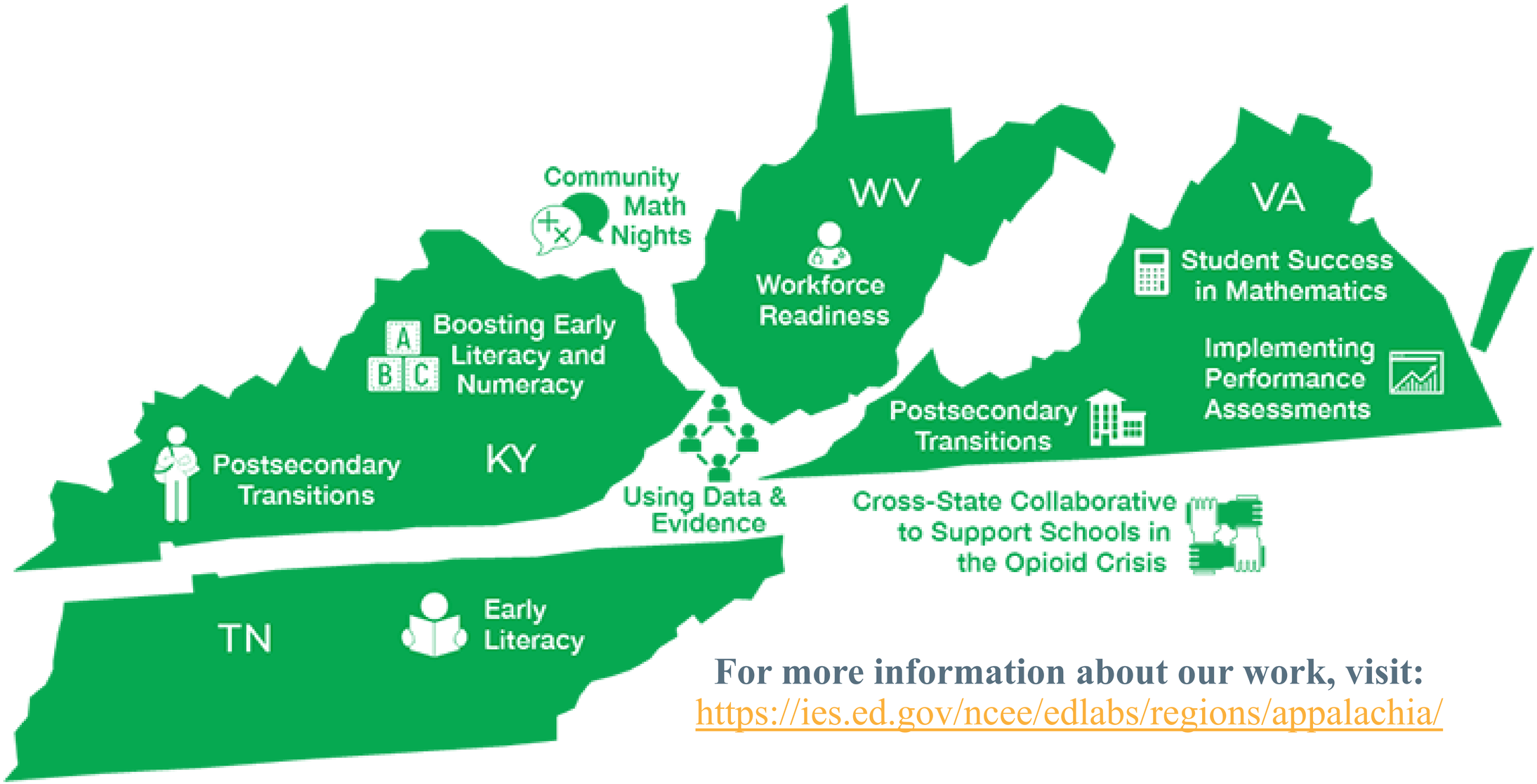


Training, Coaching, and Technical Support

Dissemination





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Overview and Framing

Pam Buffington
Partnership Lead

Student Success in Mathematics partnership: Problem statement

Not all students have the depth of skills, knowledge, and understandings necessary for success in algebra and higher-level mathematics courses.

In particular, there are gaps in algebra readiness for English learner students, students of color, students with disabilities, and economically disadvantaged students.

Effective teacher professional development

Professional development (PD) has been shown to impact student achievement positively when it:

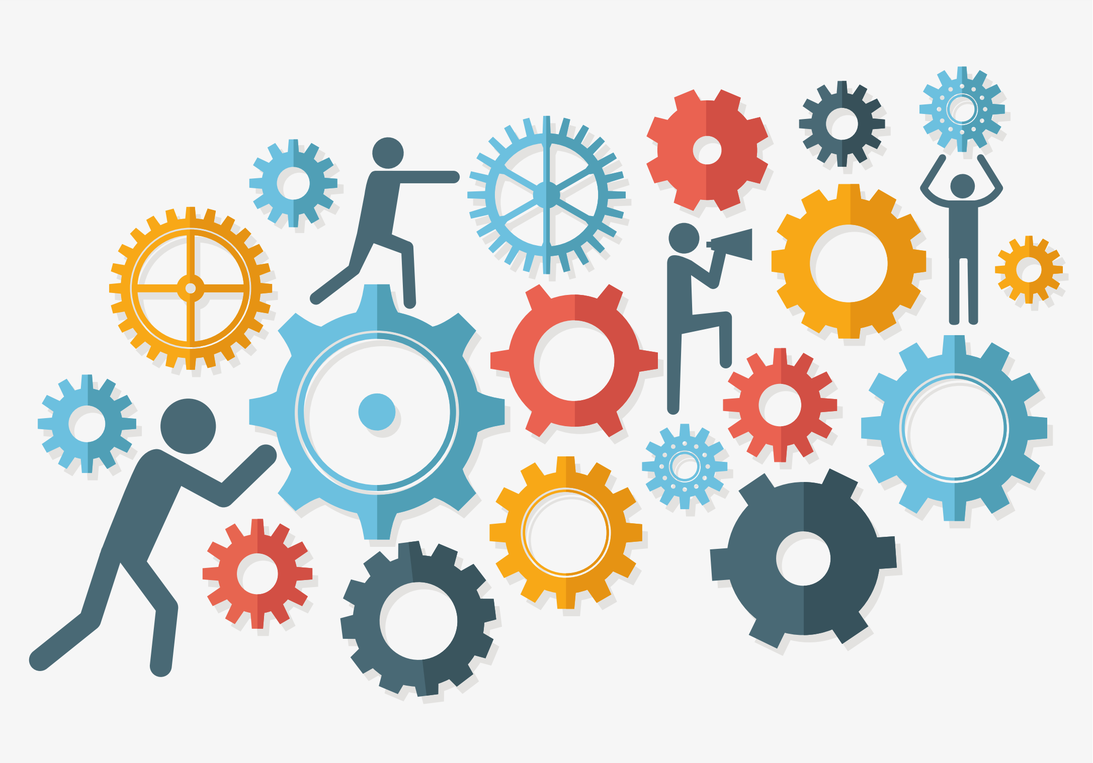
- Focuses on specific content.
- Incorporates active learning.
- Supports collaboration.
- Uses models of effective practice.
- Provides coaching and expert support.
- Offers feedback and reflection.
- Is of sustained duration.

(Bill and Melinda Gates Foundation, 2014; Darling-Hammond et al., 2017)

Webinar series goals

Build participants' capacity to design and implement a coherent professional learning model (PLM) that:

- Incorporates interconnected, evidence-based professional learning experiences.
- Enhances leaders' ability to deliver high-quality mathematics instruction.
- Supports student achievement and success.



Today's objectives

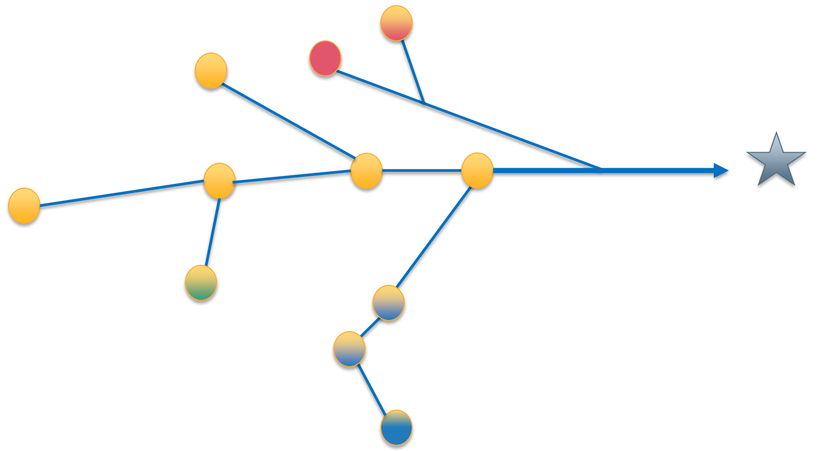
- Define considerations and components of an evidence-based mathematics PLM.
- Identify PD strategies and evidence associated with their use.
- Identify contextual factors that influence PD design in school districts.
- Apply evidence-based strategies and practices in planning a PLM using the provided template.

Professional Learning Models: Key Components

Pam Buffington
Partnership Lead

Professional learning models (PLM)

A professional learning model (PLM) is a cohesive system of professional development (PD) in which educator learning opportunities relate to each other and contribute to the same longer-term set of goals and vision for mathematics teaching and learning.



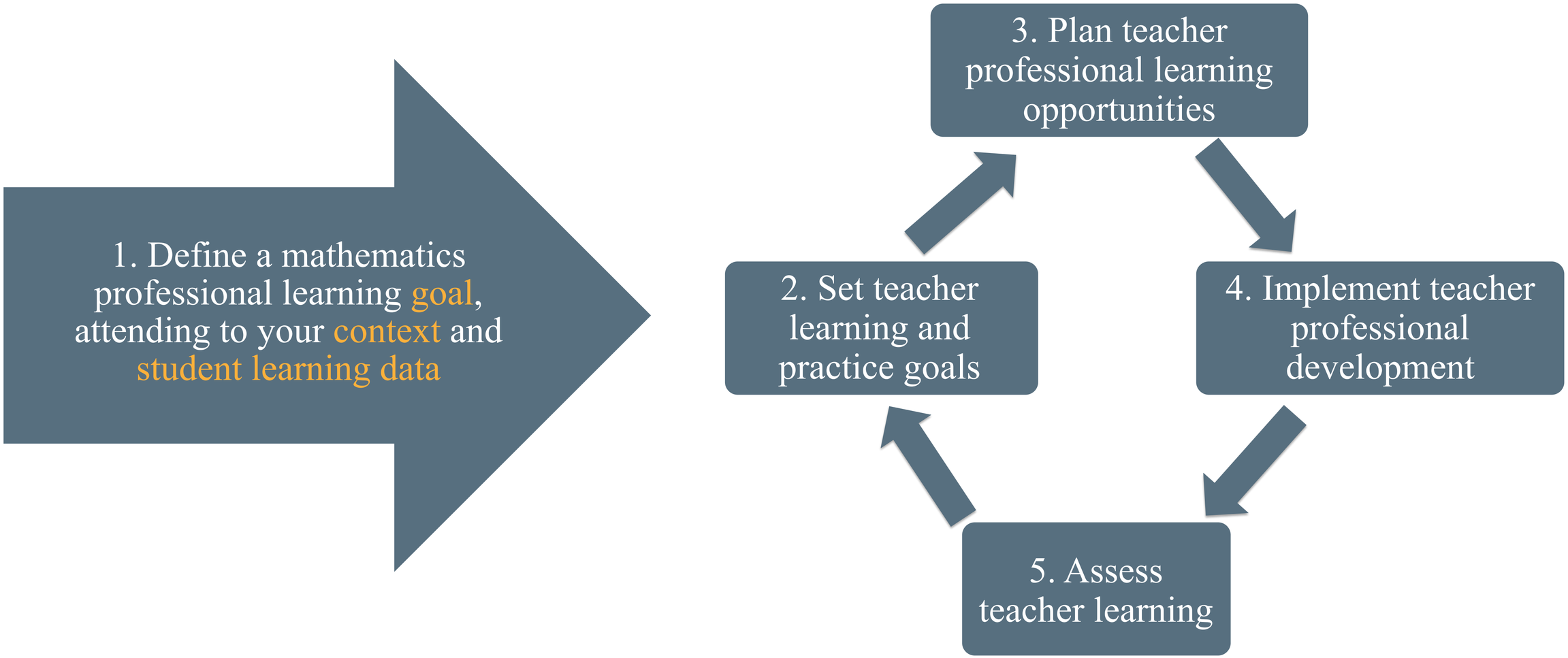
Professional learning models (PLM)

Planning for effective professional development must include:

- Aligning PD with a common vision and district-level goals,
- Connecting to standards and practices for mathematics teaching and learning,
- Considering student data and learning needs, and
- Taking the school and district context into consideration.

(Loucks-Horsley et al., 2010)

Professional learning models (PLM)



Build capacity around professional learning

To build capacity in your PLM, acknowledge and act on contextual factors within a mathematics professional learning culture by:

- Considering sustainability.
- Setting aside time for professional learning.
- Focusing on content and pedagogical knowledge.
- Covering strategies to address equity.
- Building a professional learning culture.

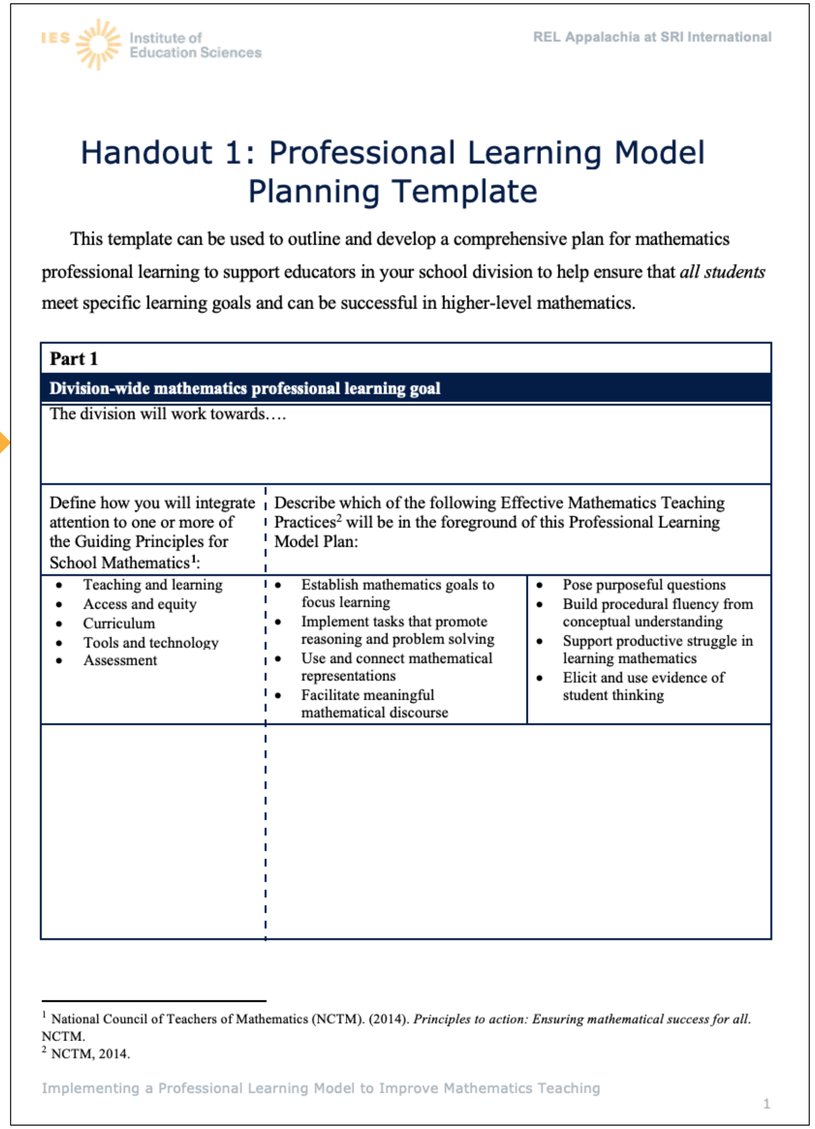
Capacity

(Loucks-Horsley et al., 2010)

Professional learning model (PLM)

1. Define a mathematics professional learning goal, attending to your context and student learning data

2. Set teacher learning and practice goals



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Handout 1: Professional Learning Model Planning Template

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Part 1

Division-wide mathematics professional learning goal

The division will work towards….

Define how you will integrate attention to one or more of the Guiding Principles for School Mathematics[1]:	Describe which of the following Effective Mathematics Teaching Practices[2] will be in the foreground of this Professional Learning Model Plan:	
• Teaching and learning • Access and equity • Curriculum • Tools and technology • Assessment	• Establish mathematics goals to focus learning • Implement tasks that promote reasoning and problem solving • Use and connect mathematical representations • Facilitate meaningful mathematical discourse	• Pose purposeful questions • Build procedural fluency from conceptual understanding • Support productive struggle in learning mathematics • Elicit and use evidence of student thinking

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[2] NCTM, 2014.

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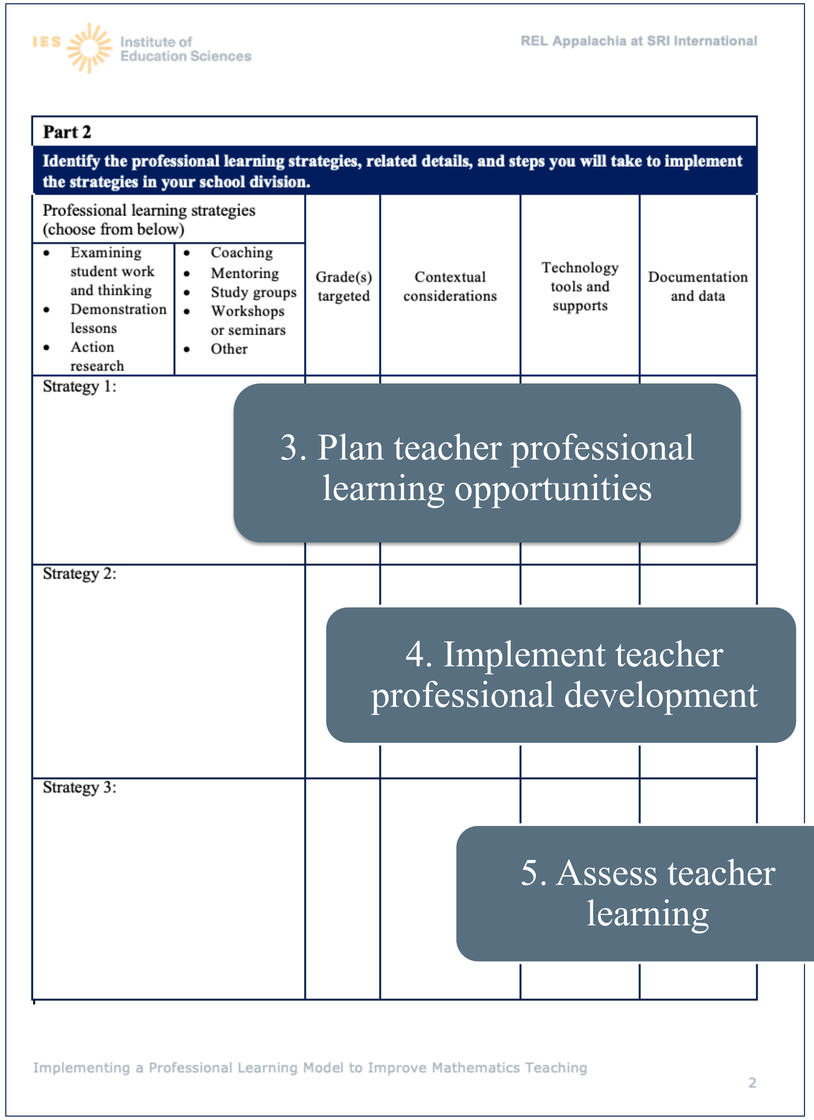

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Part 2

Identify the professional learning strategies, related details, and steps you will take to implement the strategies in your school division.

Professional learning strategies (choose from below)		Grade(s) targeted	Contextual considerations	Technology tools and supports	Documentation and data
• Examining student work and thinking • Demonstration lessons • Action research	• Coaching • Mentoring • Study groups • Workshops or seminars • Other				
Strategy 1:					
Strategy 2:					
Strategy 3:					

3. Plan teacher professional learning opportunities

4. Implement teacher professional development

5. Assess teacher learning

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Contextual factors influencing professional development

- Teachers
- Materials and instruction
- School culture and logistics
- Professional learning

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Handout 2: Contextual Factors Influencing Professional Development

Many contextual factors influence teacher professional development.[1] Review the four categories of contextual factors—teachers, materials and instruction, school culture and logistics, and professional learning—and the related prompts. Reflect on the factors that influence professional development in your school division and respond to the prompts in the table below. Consider focusing in on one grade span (i.e. PK-5, 6-8, 9-12) as you answer the questions. After working independently, we will share contextual factors influencing professional development across school divisions.

Table 1. Contextual factors influencing professional development

Teachers
1. What do you see as teachers' strengths in mathematics content?
2. What do you see as teachers' pedagogical strengths?
3. What specific barriers have teachers faced when implementing new practices in their classrooms?
4. What positive or negative experiences have teachers had with professional development?
Materials and instruction
1. Are there any issues with curricular materials being available to all teachers?
2. Are there concerns about whether the curricular materials are focused,

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

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(Loucks-Horsley et al., 2010)

Contextual factors influencing professional development

Consider:

- Teachers' strengths in mathematics content.
- Teachers' pedagogical strengths.
- Barriers that teachers have faced when implementing new practices in their classrooms.
- Teachers' prior positive or negative experiences with PD.

Contextual factors influencing professional development

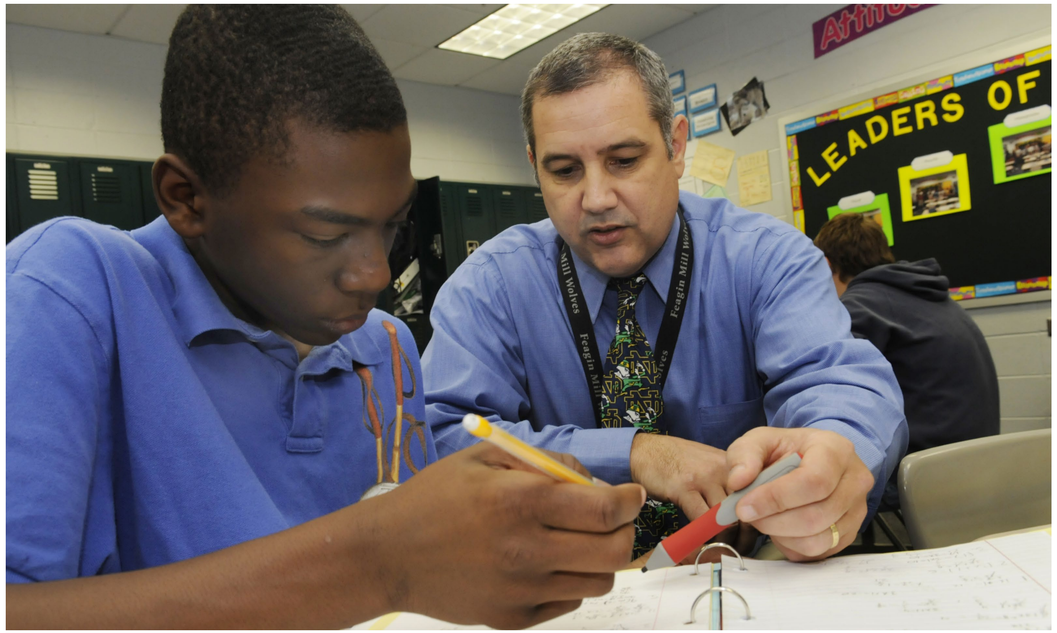
Consider materials and instruction:

- Availability of curricular materials.
- Rigor and coherence of curricula.
- Intended implementation of curricula.
- Learning environment.
- Barriers to full access.
- Barriers to problem solving and reasoning.

Contextual factors influencing professional development

Consider school culture and logistics:

- Structures that support collaborative practice.
- Beliefs about students and their capacities.
- Assumptions about race, class, educational, and linguistic differences among students.



Contextual factors influencing professional development

Consider professional learning:

- Time on discussions of mathematics teaching and learning.
- Sharing teacher practice.
- Working collaboratively to solve instructional challenges.
- Reflective dialog.

Poll: Contextual factors

Where will you begin?

In the poll:
Check the contextual factor that will be your primary consideration as you prepare to set teacher learning and practice goals.

In the chat:
Explain why you choose this factor as your primary consideration.

- ❑ Teachers
- ❑ Materials and instruction
- ❑ School culture and logistics
- ❑ Professional learning

Professional learning model (PLM)

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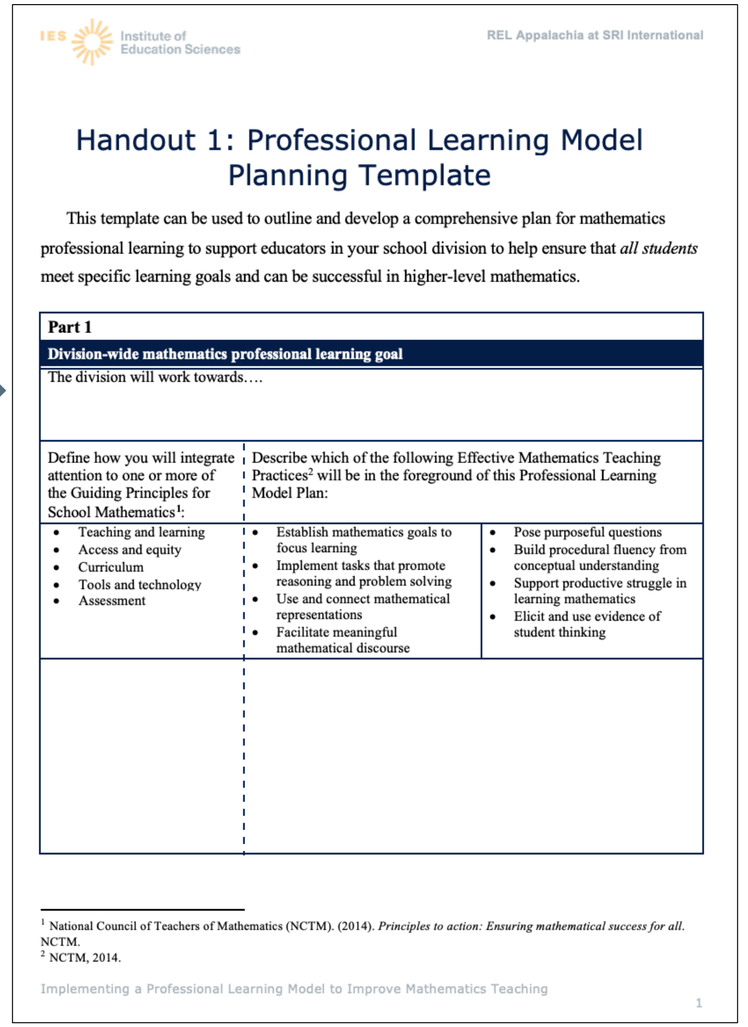

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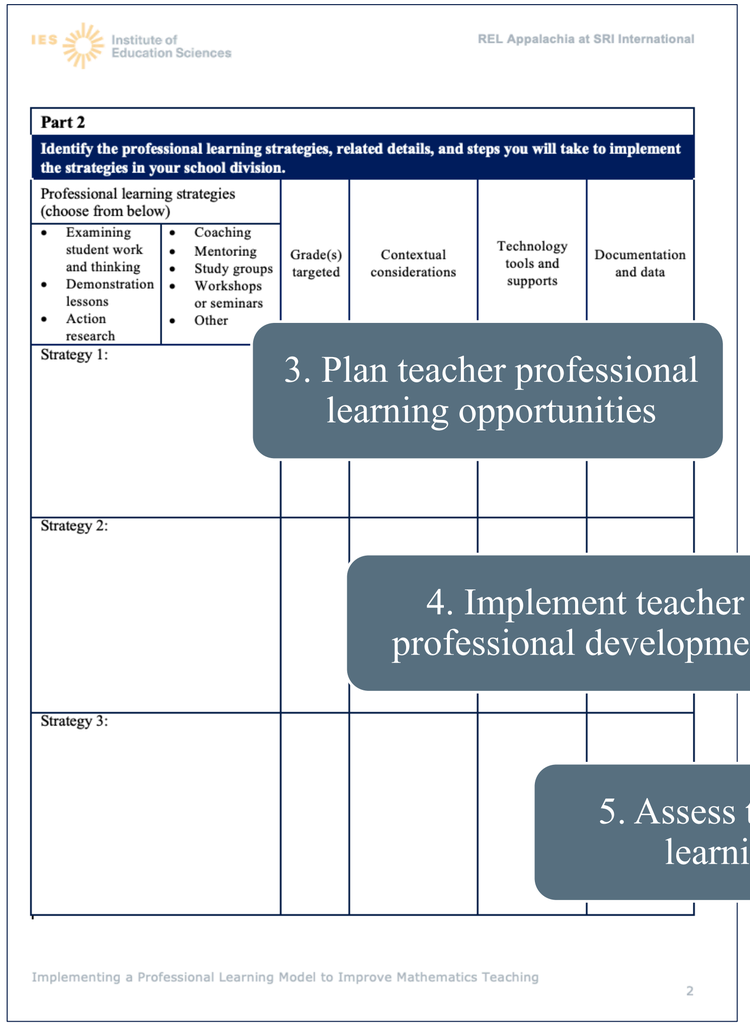

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Strategy 2:					
Strategy 3:					

Implementing a Professional Learning Model to Improve Mathematics Teaching — 2

3. Plan teacher professional learning opportunities

4. Implement teacher professional development

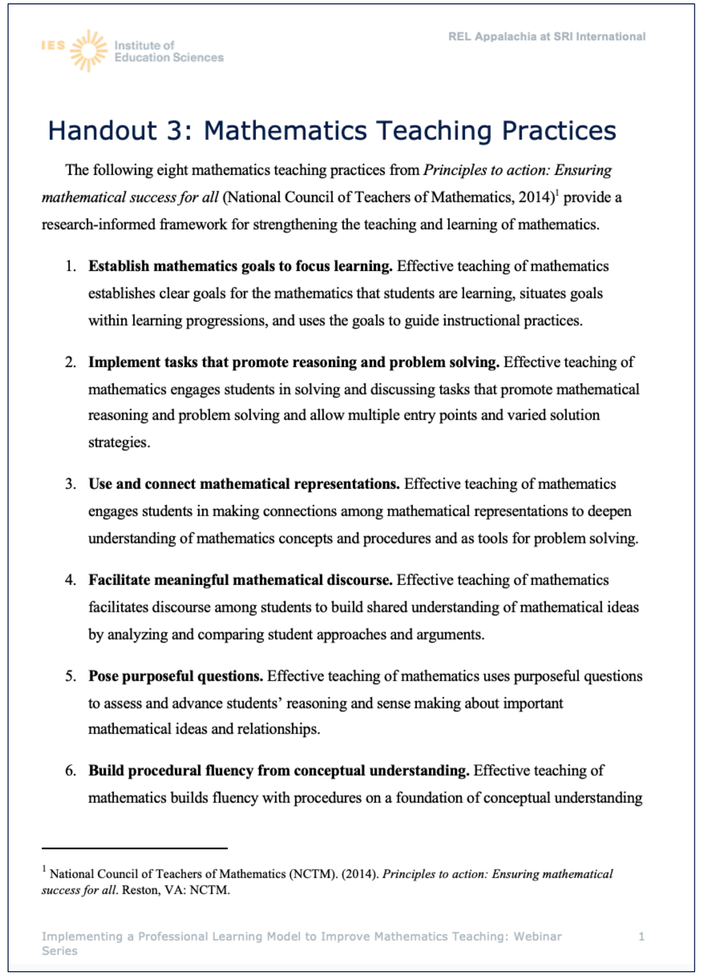
5. Assess teacher learning

Next: Set teacher learning and practice goals

Effective Mathematics Teaching Practices

1. Establish mathematics goals to focus learning.
2. Implement tasks that promote reasoning and problem solving.
3. Use and connect mathematical representations.
4. Facilitate meaningful mathematical discourse.
5. Pose purposeful questions.
6. Build procedural fluency from conceptual understanding.
7. Support productive struggle in learning mathematics.
8. Elicit and use evidence of student thinking.

(National Council of Teachers of Mathematics, 2014)



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Handout 3: Mathematics Teaching Practices

The following eight mathematics teaching practices from *Principles to action: Ensuring mathematical success for all* (National Council of Teachers of Mathematics, 2014)[1] provide a research-informed framework for strengthening the teaching and learning of mathematics.

1. **Establish mathematics goals to focus learning.** Effective teaching of mathematics establishes clear goals for the mathematics that students are learning, situates goals within learning progressions, and uses the goals to guide instructional practices.
2. **Implement tasks that promote reasoning and problem solving.** Effective teaching of mathematics engages students in solving and discussing tasks that promote mathematical reasoning and problem solving and allow multiple entry points and varied solution strategies.
3. **Use and connect mathematical representations.** Effective teaching of mathematics engages students in making connections among mathematical representations to deepen understanding of mathematics concepts and procedures and as tools for problem solving.
4. **Facilitate meaningful mathematical discourse.** Effective teaching of mathematics facilitates discourse among students to build shared understanding of mathematical ideas by analyzing and comparing student approaches and arguments.
5. **Pose purposeful questions.** Effective teaching of mathematics uses purposeful questions to assess and advance students' reasoning and sense making about important mathematical ideas and relationships.
6. **Build procedural fluency from conceptual understanding.** Effective teaching of mathematics builds fluency with procedures on a foundation of conceptual understanding

[1] National Council of Teachers of Mathematics (NCTM). (2014). *Principles to action: Ensuring mathematical success for all*. Reston, VA: NCTM.

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Next: Set teacher learning and practice goals

Access and Equity principle:

An excellent mathematics program requires that all students have access to a high-quality mathematics curriculum, effective teaching and learning, high expectations, and the support and resources needed to maximize their learning potential.

(National Council of Teachers of Mathematics, 2014)

Professional learning model (PLM)

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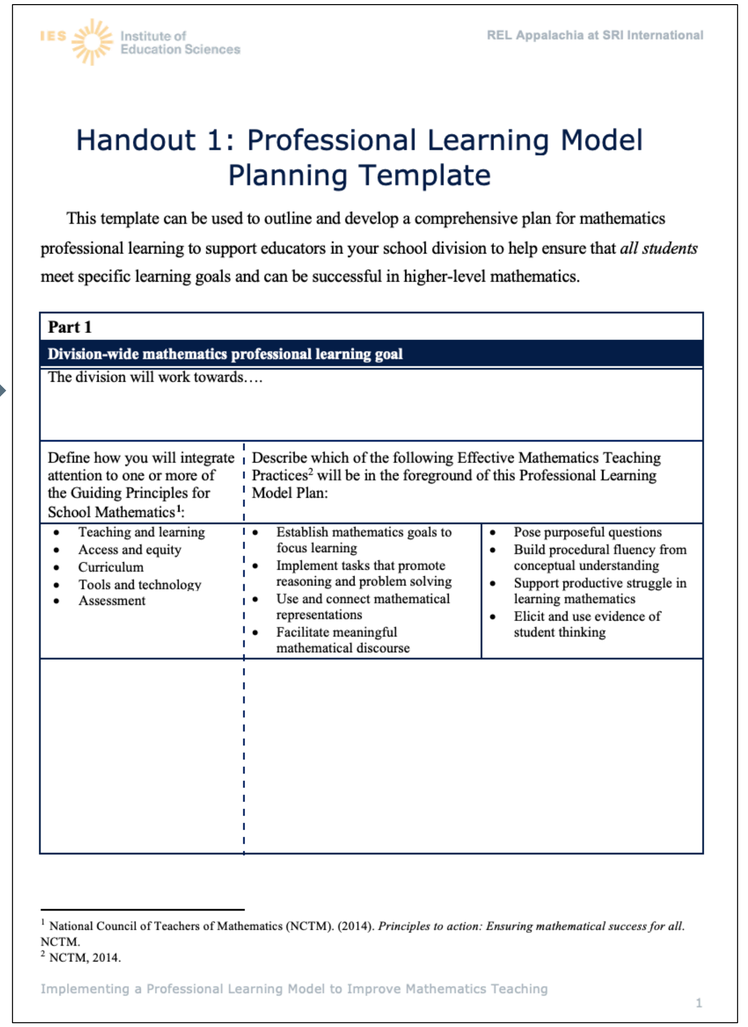

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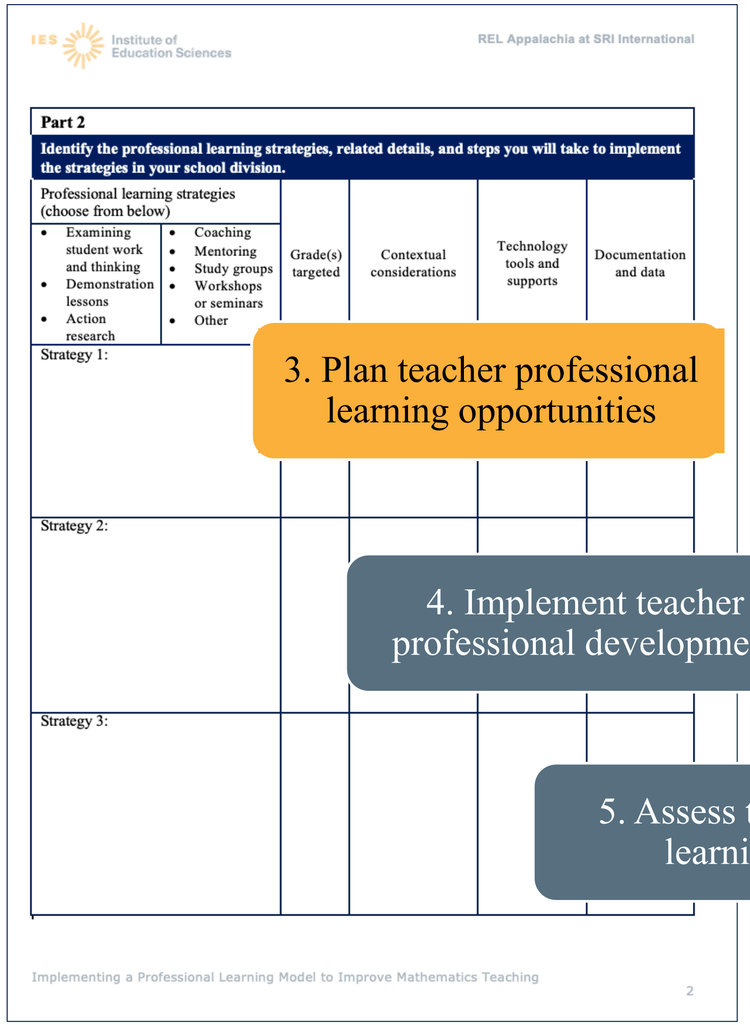

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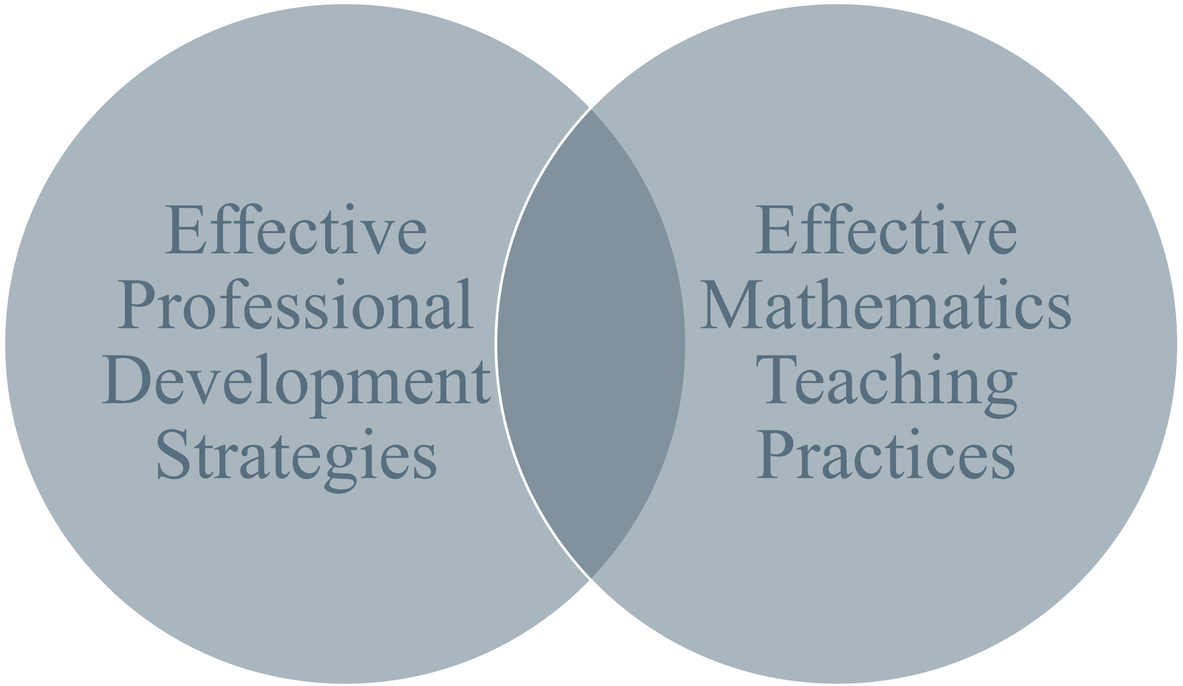
Next: Plan teacher professional learning opportunities

Selected strategies for teacher professional learning



Handout 4: Selected Strategies for Professional Learning

Review the following professional learning strategies from *Designing professional development for teachers of science and mathematics* (Loucks-Horsley et al., 2010) [1] and the critical elements of the strategy. Reflect on the strategies listed: **Do current professional learning opportunities in your division match any of the strategies listed below? Or is there a strategy that you'd be most interested in implementing?**

- Examining student work and thinking. Critical elements include:
  - An experienced content expert guides collaborative experiences.
  - Teachers spend majority of time examining student work.
  - Discussion and examination of student work have a focused goal and purpose.
  - Structured protocols enhance the learning experience.
- Demonstration lessons. Critical elements include:
  - Teachers have available time and structures to meet with other teachers and to observe.
  - Groups of teachers (not individual teachers) observe each other.
  - There is a cycle of pre-discussion, observation, and post discussion.
- Action Research. Critical elements include:
  - Teachers contribute to or formulate their own questions and collect data to answer these questions.
  - Teachers use an action research cycle, specifically identifying a problem and a question, collecting data, analyzing data, and reformulating the problem and question to continue their action research.
  - Teachers have access to sources of knowledge and stimulation from outside their schools.

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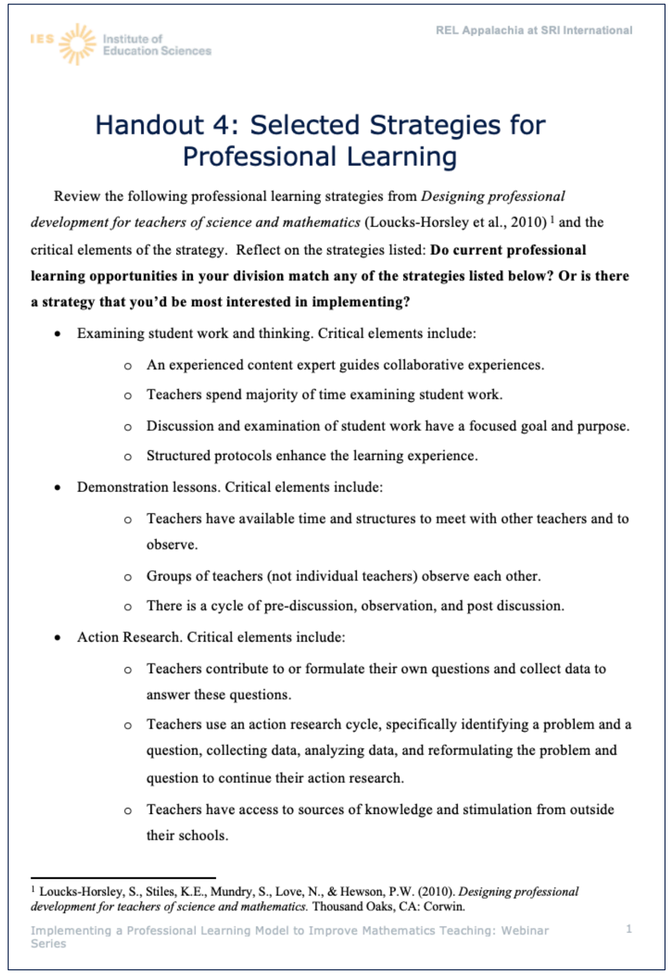
Strategies for professional learning

Pick two:

- Review the list of selected strategies for professional learning.
- Choose the strategy that was used when you had the **very best** professional learning experience.
- Choose the strategy that you led or participated in that was among your **worst** professional learning experiences.



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Your best and worst professional learning experience

Poll 1 – Choose the strategy that was used when you had the **very best** professional learning experience

- ❑ Examining student work and thinking
- ❑ Demonstration lessons
- ❑ Action Research.
- ❑ Coaching
- ❑ Mentoring
- ❑ Study Groups
- ❑ Workshops, institutes, and seminars
- ❑ Immersion in inquiry in mathematics
- ❑ Curriculum development alignment, adaptation, or implementation
- ❑ Partnerships with mathematicians
- ❑ Professional networks

Poll 2 – Choose the strategy that was used when you had the **worst** professional learning experience

- ❑ Examining student work and thinking
- ❑ Demonstration lessons
- ❑ Action Research.
- ❑ Coaching.
- ❑ Mentoring
- ❑ Study Groups
- ❑ Workshops, institutes, and seminars
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- ❑ Curriculum development alignment, adaptation, or implementation
- ❑ Partnerships with mathematicians
- ❑ Professional networks

Your best and worst professional learning experience

What strategy for mathematics professional learning would you like to see being used within your district more often?

Choose the strategy that you would like to see being used within your school division more often.

- ❑ Examining student work and thinking
- ❑ Demonstration lessons
- ❑ Action Research.
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Professional Learning Models Planning: Lessons from the Field

Jill Neumayer DePiper
Partnership Staff

Brian Nussbaum
Partnership Member

Professional learning model (PLM)

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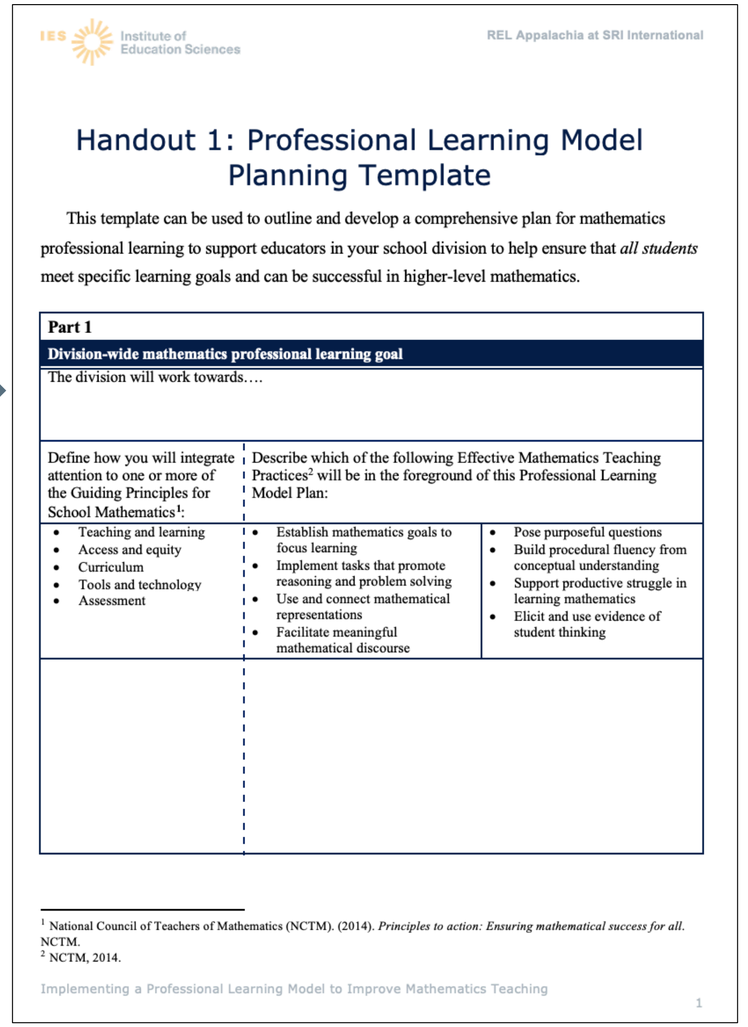

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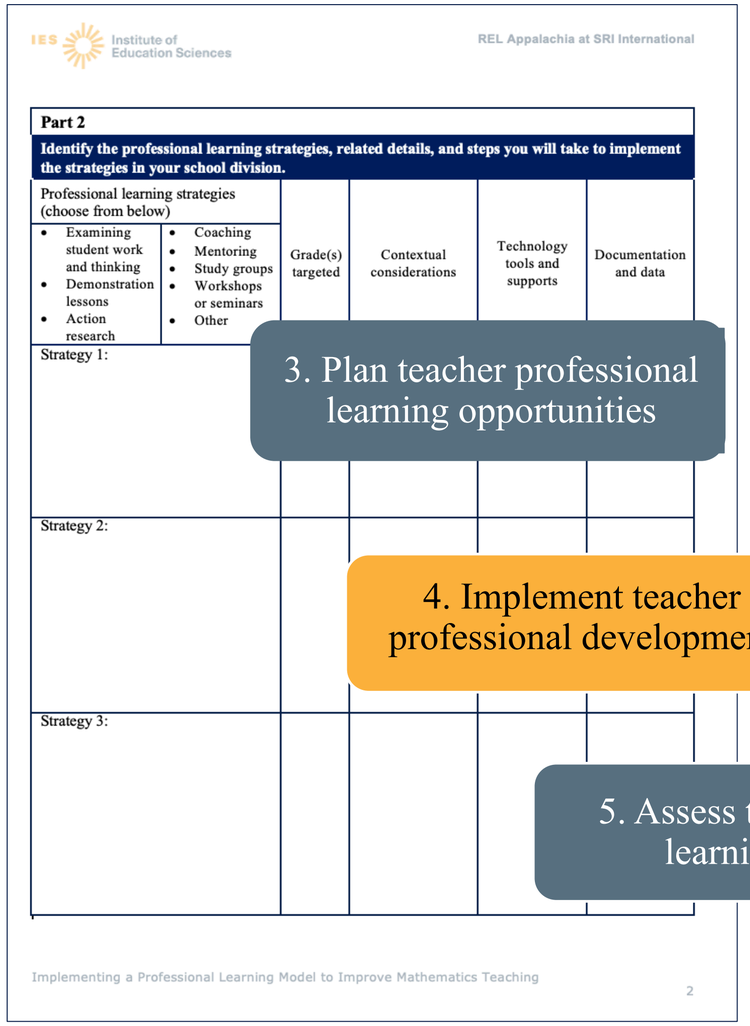

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Implementing a Professional Learning Model to Improve Mathematics Teaching 2

3. Plan teacher professional learning opportunities

4. Implement teacher professional development

5. Assess teacher learning

Strategies versus logistics

- Strategies for professional learning are not about the logistics.
- Strategies are actions that focus on specific mathematics teaching practices.
- Selection of strategies considers context, school culture, relationships, and logistics.
- A PLM includes a focus on specific activities (strategies) within a framework.

PLM planning: Lessons from the field

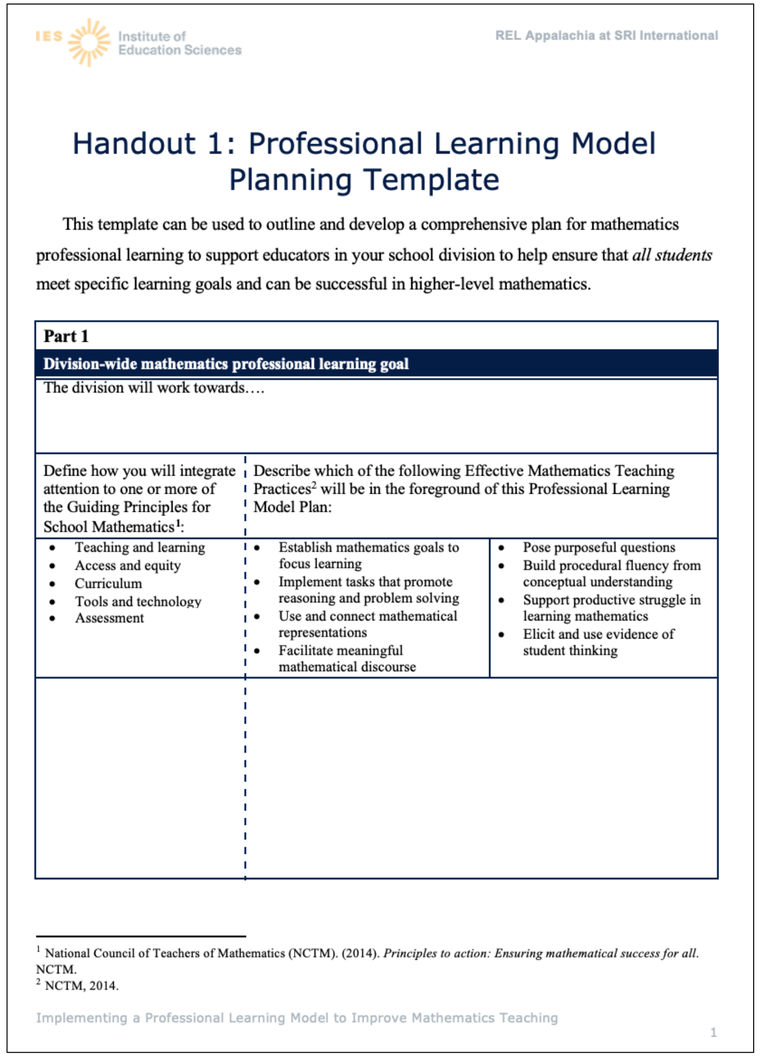
Feedback from Student Success in Mathematics partner, Brian Nussbaum

- PLM Overview
  - Focused on the *Mathematics Teaching Practice: Implement tasks that promote reasoning and problem solving*
  - Used coaching, study groups, analysis of student work
- Reflection on the experience

Questions for SSM member

- Which math teaching and learning practice goal did you choose and why?
- How did the PLM help you organize your professional development opportunities?
- Who was involved in your implementation of this planning?
- How did measuring teacher learning help you plan subsequent teacher learning?

Other questions



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Handout 1: Professional Learning Model Planning Template

This template can be used to outline and develop a comprehensive plan for mathematics professional learning to support educators in your school division to help ensure that *all students* meet specific learning goals and can be successful in higher-level mathematics.

Part 1

Division-wide mathematics professional learning goal

The division will work towards….

Define how you will integrate attention to one or more of the Guiding Principles for School Mathematics[1]:	Describe which of the following Effective Mathematics Teaching Practices[2] will be in the foreground of this Professional Learning Model Plan:	
• Teaching and learning • Access and equity • Curriculum • Tools and technology • Assessment	• Establish mathematics goals to focus learning • Implement tasks that promote reasoning and problem solving • Use and connect mathematical representations • Facilitate meaningful mathematical discourse	• Pose purposeful questions • Build procedural fluency from conceptual understanding • Support productive struggle in learning mathematics • Elicit and use evidence of student thinking

[1] National Council of Teachers of Mathematics (NCTM). (2014). *Principles to action: Ensuring mathematical success for all.* NCTM.
[2] NCTM, 2014.

Implementing a Professional Learning Model to Improve Mathematics Teaching

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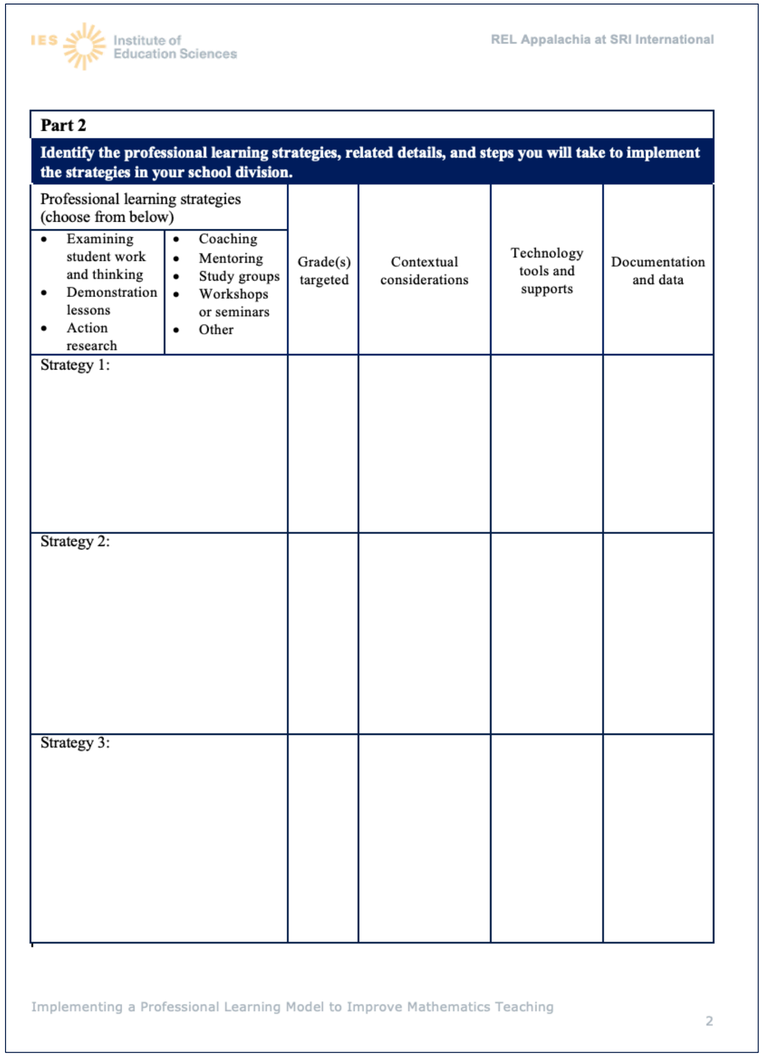

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Part 2

Identify the professional learning strategies, related details, and steps you will take to implement the strategies in your school division.

Professional learning strategies (choose from below)		Grade(s) targeted	Contextual considerations	Technology tools and supports	Documentation and data
• Examining student work and thinking • Demonstration lessons • Action research	• Coaching • Mentoring • Study groups • Workshops or seminars • Other				
Strategy 1:					
Strategy 2:					
Strategy 3:					

Implementing a Professional Learning Model to Improve Mathematics Teaching

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Closing

Pam Buffington
Partnership Lead

Review of today's objectives

- Define considerations and components of an evidence-based mathematics PLM.
- Identify PD strategies and evidence associated with their use.
- Identify contextual factors that influence PD design in their respective school districts.
- Apply evidence-based strategies and practices in planning their PLM using the provided template.

Looking ahead

- Identify and describe possible data sources and methods to use to understand teacher learning and the success of teacher professional development opportunities.
- Apply learning on data collection and analysis to developing a data collection plan and to use during the second stage of planning a cohesive PLM using the provided template.
- Identify key considerations when using their current PLM to design future professional learning opportunities.

Next steps

- Complete:
  - Handout 1, *Professional Learning Model Action Planning Template*
  - Handout 2, *Contextual Factors Influencing Professional Development*
- Register for and attend Webinar 2 on **May 12, 2021, 3:00-4:40** (EST)

Reflecting on the day

1. What is something we discussed that **squared** with your experience?

2. What are **two points** you want to remember?

3. What are you still wondering about?

Questions?

For our growth…

We appreciate your feedback as we continue to improve our work to meet your needs!

SFS Link: https://sri.co1.qualtrics.com/jfe/form/SV_ag6TJyaGkxMxM1f

Contact us

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Thank you!

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

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