EDUQUATE

The K-5 Problem Solving Routine Overview

The EL Education K-5 Problem Solving Routine (PSR) is a supplemental component of math instruction done 4-5 times per week for 30-40 minutes in kindergarten through fifth grade. It is done in addition to math units/modules of study, the daily time when students engage with a comprehensive math curriculum like Illustrative Mathematics. A sample curriculum map is provided to teachers who implement the K-5 Problem Solving Routine as a resource; however, ***it is not a curriculum***. PSR is a routine that merges best math practices and research and the EL Education Core Practices to achieve excellent and equitable outcomes for all students in mathematics.

See The K-5 Problem Solving Routine in action in the videos below and read on for additional information about the routine's core structure, practices, and underlying research base.

- 1st Grade: Monitor & Confer ~ Select & Sequence ~ Class Discussion
- 3rd Grade: Questioning, Anchor Charting, and Discourse ~ Grappling & Discourse

PSR provides schools with a cohesive set of materials and professional learning to develop students' abilities in all three dimensions of student achievement and across all five mathematical proficiencies.

Mastery of Knowledge and Skills	Culture & Character	High Quality Student Work
• Conceptual understanding* within major elementary content domains (addition and subtraction, multiplication and division, fractions, and decimals) • Problem solving skills* • Procedural fluency* with a focus on flexibility and appropriate strategy selection	• Problem solving skills:* teachers and students expect to make mistakes and share "rough draft thinking" as an essential part of the learning process • Communication* and collaboration: Students make their thinking and reasoning public, listen actively, question one another, and appreciate, compare, and contrast their thinking. • Mathematical identities:* students come to believe that mathematics have purpose and value in their lives and that they are capable of learning and doing mathematics through hard work and perseverance	• Create multiple models and strategies for a given problem type, increasing in complexity and craftsmanship over time • Critique mathematical representations and evaluate their affordances and drawbacks* • Engage with authentic tasks that have real world applications and in some cases can be integrated with projects or expeditions

*Correspond directly to or are embedded in a Mathematical Proficiency[1]

[1] National Research Council. *Adding it Up: Helping Children Learn Mathematics*. The National Academies Press, 2001.

At the heart of the K-5 Problem Solving routine is the use of children's thinking to drive instructional decisions. Teachers make informed decisions about how to adapt their curriculum maps and instruction throughout the year to advance student thinking. Teachers' capacity to make these decisions is developed by (1) learning about the development of children's mathematical thinking within particular content domains and (2) advancing their pedagogical skills to teach math through problem-solving. Foundational structures, practices, and research to the routine include:

- Cultivate a classroom culture that nurtures positive math identities and supports equitable engagement and collaboration through the use of high-quality tasks, norms, roles, status disruptors, accountability structures, etc (complex instruction).[2]
- Cognitively Guided Instruction (CGI) research provides the bedrock for problem types and progressions of models and strategies, mathematical content knowledge that is essential for teachers to understand and use to facilitate effective constructivist learning.[3] This content knowledge is rarely learned in elementary teacher preparation problems.
- An inquiry lesson structure, Launch-Explore-Discuss-Synthesize (LEDS), that supports students to learn with understanding by building on their intuitive approaches, illuminating a rich network of interconnections, and providing opportunities to generate new knowledge by extending what they already understand to new problems.[4]
- The 5 Practices for Orchestrating Effective Discourse are essential for setting goals, task selection or creation, and planning and facilitating meaningful constructivist learning.[5]
- Conferring and whole class questioning strategies that clarify what students have done and what they understand about what they have done and use that as a basis to advance their thinking, making progress towards lesson learning goals.[6]

Are you interested in implementing The K-5 Problem Solving Routine in your school or district?
Contact us to learn more about how we can support you!

[2] See Stanford GSE on Complex Instruction: https://complexinstruction.stanford.edu/
[3] Carpenter, Thomas P, et al. Children's Mathematics. Heinemann, 2015.
[4] Carpenter, Thomas P, et al. Children's Mathematics. Heinemann, 2015.
[5] Smith, Margaret, et al. 5 Practices in Practice [Elementary]: Successfully Orchestrating Mathematics Discussions in Your Elementary Classroom. Corwin, 2019.
[6] Munson, Jen, et al. In the Moment: Conferring in the Elementary Math Classroom. Heinemann, 2018.