Innovation Configuration Map: Clarifying Effective Mathematics Teaching Practices

Developing a culture of organizational learning and collaborative communities of practice is among the greatest challenges and goals of any instructional leader – district or building administrator, curriculum specialist, instructional coach, or teacher-leader. The use of reflective tools can guide instructional leaders as they grapple with the complexities of building and sustaining ongoing collaborative learning. This document provides a suite of such tools to help instructional leaders enact and foster systemic change by creating the kinds of district, school, and classroom environments needed to prepare students for success. Regular application of these tools helps leaders determine needs, plan actions, measure the impact of those actions and support others through organizational change.

A change, or innovation, can assume several different configurations that encompass the ideal state envisioned by its designers and different variations arising from user interpretation and experience. Innovation Configuration (IC) maps are descriptive documents that provide clarity by detailing what an innovation should look like in practice. IC maps detail the *how* and *what* of an innovation and provide a way to understand the possible progression of behaviors. These maps are useful not only throughout the change process, but also once an innovation is fully implemented and leaders strive to maximize outcomes. IC maps allow educator teams to develop a common understanding of effective behaviors, identify where additional support is needed, and encourage self-reflection and self-assessment. It is important to note that IC maps are not intended as evaluative tools. Instead, they are a means to assess and measure the various forms of innovation implementation and inform goal setting and next steps. Inherent in the productive use of IC maps is the need to openly share their purpose and intent and use results to enhance collaboration in ways that allow all voices to contribute.

The following IC maps, organized around four of the eight National Council of Teachers of Mathematics' effective math teaching practices,– *Implement tasks that promote reasoning and problem solving, Use and connect mathematical representations, Elicit and use evidence of student thinking,* and *Pose purposeful questions* – give instructional leaders purposeful opportunities to pause, reflect, and compare current practice to organizational values and expectations.

Instructional leaders can use these tools in ongoing continuous improvement efforts to –

- Initiate or focus the conversation about instructional leadership.
- Examine the current state of instructional leadership in a district or school.
- Design or strengthen existing district or school structures for collaboration and learning.
- Support job-embedded professional leadership growth and development.
- Guide decision-making about how to leverage instructional leadership to improve teaching and learning.

You can further your understanding of the research-based teaching practices covered in the IC maps by reading the National Council of Teachers of Mathematics' book, Principles to Actions: Ensuring Mathematics Success for All and continue your learning on the purpose and use of IC maps by watching this video.

Innovation Configuration Map: Clarifying Teaching

3. Use and connect mathematical representations[4] (Promote purposeful student selection of appropriate representations; facilitate student dialogue about explicit connections among representations)				
Level 1	**Level 2**	**Level 3**	**Level 4**	**Level 5**
Teachers: • Implement rich tasks[5] to support students' examination of concepts through a variety of lenses. • Introduce multiple representations. • Promote discussion in which students use representations to justify mathematical understanding and reasoning. • Facilitate discourse among students to enable them to make connections among representations and to move flexibly between them. • Encourage students to select and use a variety of mathematical representations to solve problem solving.	Teachers: • Implement tasks to support student examination of concepts through a variety of lenses. • Introduce multiple representations. • Encourage discussion to explain problem solving and reasoning. • Make connections for students between representations. • Encourage students to use more than one mathematical representation to solve problems.	Teachers: • Implement tasks to support student examination of concepts. • Introduce multiple representations. • Encourage students to use more than one mathematical representation to solve problems.	Teachers: • Encourage students to use at least one mathematical representation for solving a problem.	Teachers: • Direct students to use a particular mathematical representation for solving a problem.

[4] Students can access mathematical ideas through multiple variations of contextual, visual, verbal, physical, and symbolic representations.
[5] National Council of Teachers of Mathematics' *Principles to actions: Ensuring mathematics success for all* (NCTM, 2014) defines a rich task as one that promotes reasoning and problem solving, and offers multiple entry points through the use of varied tools, multiple representations, and solution strategies. Tasks should be at grade level and should align with stated goal(s).

Innovation Configuration Map: Clarifying Learning

3. Use and connect mathematical representations[2] (Select appropriate representations; describe and justify mathematical reasoning; use multiple representations.)				
Level 1	**Level 2**	**Level 3**	**Level 4**	**Level 5**
Students: • Make purposeful selections of representations to reveal underlying structures of mathematics. • Identify similarities and differences between representations. • Engage in dialogue about explicit connections between representations. • Move flexibly[3] between multiple representational forms such as contextual, visual, verbal, physical, and symbolic.[4]	Students: • Make purposeful selections of representations to reveal mathematics in a given lesson. • Identify similarities between representations. • Engage in dialogue about connections between representations. • Move between multiple representational forms.	Students: • Make purposeful selections of representations. • Identify similarities between representations. • Engage in dialogue about representations. • Move through a logical path in one direction from concrete forms through conceptual forms.	Students: • Use representations prescribed by the teacher. • Engage in dialogue about representations that were prescribed by the teacher. • Use multiple representations.	Students: • Use representations prescribed by the teacher.

[2] Students can access mathematical ideas through multiple variations of contextual, visual, verbal, physical, and symbolic representations.
[3] Students who are moving flexibly move between representations, understanding how different forms are interconnected. For more information, see National Council of Teachers of Mathematics' *Principles to actions: Ensuring mathematical success for all*, p. 25 (Reston, VA: NCTM, 2014).
[4] Using different representations is akin to viewing art through different lenses. With each new look, students gain new perspective, making the picture richer. Look for students to use representations throughout a unit of study rather than a single class.