



## **Authors' Response to EdReports' Review of *Investigations 3***

In light of the recent release (March 14, 2017) of EdReports' review of *Investigations 3*, the authors offer the following response:

*Investigations 3* is a focused, coherent, and rigorous K-5 mathematics curriculum. Fully aligned to the content and practice standards of the Common Core State Standards (CCSS), deep and careful attention is paid to mathematics content and to student thinking and understanding. Making sense of mathematics is the heart of the work, for students and teachers.

The EdReport review found that all grade levels, K-5, met the expectation for rigor and balance and that Grades K, 1, 2, and 5 were found to meet the expectation for focus and coherence. It should be noted that Grades 3 and 4 were viewed as “partially meets” each for a single, limited reason. The author team was surprised that all grade levels only partially met the expectation for Mathematical Practices-Content Connection and believe this is an indication of EdReports' limited view of what the Practices mean and what they look like in classrooms.

### **Content Alignment**

- The Grade 3 score of 0/4 for Criterion 1b is misleading. EdReports assigns a binary score of either 0 or 4 points based on an arbitrary threshold of 65% coverage of major work of the grade level. The report finds that 63% of the Grade 3 sessions focus on the major work. It is likely that the work on addition, subtraction and place value was a factor in the 63 % rating of time spent on major work of the grade. The authors made a deliberate decision to include two addition/subtraction units in the Grade 3 curriculum. While this content is not identified as major work in Grade 3, extensive field testing and teacher feedback suggested that Grade 3 students need focused and deep work in order to solidify their conceptual understanding and procedural fluency with addition and subtraction of numbers up to 1,000. The authors are confident that the Grade 3 curriculum meets the expectation for focus.
- The Grade 4 score of 0/2 for Criterion 1a is incorrect. Reviewers claim that “statistical distributions appear in the assessments” in Grade 4 Unit 2. These claims—that students are given a line plot and asked to identify the outlier” and that the “Comparing Numbers of Cavities” assessment asks students to use statistical distributions—are simply false. There is no mention of range or outlier in any assessment benchmark or in any of the



Math Focus Points. Therefore, the score should be 2 out of 2, meaning Grade 4, as in K, 1, 2, 5, meets EdReports' expectations for Focus and Coherence.

## Mathematical Practice-Content Connections

The review of the Mathematical Practices, particularly Indicators 2f (attending to the full meaning of each practice standard) and 2g (materials support the Standards' emphasis on mathematical reasoning), are perhaps the most egregious errors in this review of *Investigations 3* K-5.

*Investigations 3* provides targeted, intentional instruction around the Mathematical Practices, always embedded in the mathematical content of each unit. The review seems to suggest that the Practices are a list to be checked off, but only if *all* of the practice is being done *all* of the time, and only if students are prompted by the materials or their teacher to engage in the Practice. This limited, narrow interpretation of the Practices seems to have obscured the genuine, authentic, and integrated approach that the *Investigations* curriculum uses to engage students in those Practices.

- Indicator 2f (attending to the full meaning of each practice standard) received scores of 1 out of 2 at every grade level. This rating ignores the tremendous amount of evidence within the curriculum units that supports teachers in attending fully to the meaning of the practice and shows a misunderstanding of the meaning of the Math Practices.

*Investigations 3* **fully attends** to the meaning of each Practice standard:

- There are two essays (Mathematical Practices in this Unit) for each practice at every grade level; approximately 20-30 sidebar notes about the Practices in each unit; and two assessment checklists about the Practices in each unit.
- Considered as a whole—at the unit, grade, and complete K-5 curriculum levels—these features provide a robust, integrated approach for learning and practicing how to engage in these practices. The work with the Mathematical Practices is always connected to the math content students are learning.

There are numerous flaws in the ratings for indicator 2f, at every grade level.

- The claims that *Investigations 3* does not fully attend to the Math Practice center around MPs 1, 4, and 5. These findings are inaccurate at many different levels, and show a misunderstanding of either the MP itself, or how the MP is addressed in the curriculum.



- **MP1: Make sense of problems and persevere in solving them.** The review suggests that students will not make sense of problems, or persevere in solving them, unless the materials or teacher explicitly tells them do so. This is the antithesis of one of the guiding principles of *Investigations*: “Students have mathematical ideas”. It’s a naïve assumption—that simply by asking students to make sense, or to persevere, that they are going to do so.
  - **MP4: Model with mathematics.** The only definition of MP4 used in the review is “modeling a real-world problem that could arise in everyday life, society, or the workplace.” This interpretation ignores text in the CCSS-M which reads “In early grades, this might be as simple as writing an addition equation to describe a situation...” (p. 7), as well as the much more detailed description of this Practice in the Elementary Elaborations (<http://commoncoretools.me/wp-content/uploads/2014/02/Elaborations.pdf>).
  - **MP5: Use appropriate tools strategically.** The review seems to focus exclusively on one part of MP5: choosing among a variety of tools. It uses as evidence times when a tool—such as an array or a Ten Frame—is being introduced or used as part of game to claim that students are not allowed to choose a tool. This interpretation ignores the fact that, before students can choose to use a tool (e.g. an array), they must first understand its structure, how it can be used, and when it makes sense to use it. Beyond that, it makes no sense to allow students to choose a different tool when the tool being used is the gameboard; changing the gameboard, changes the game.
- The ratings for 2g (materials support the Standards' emphasis on mathematical reasoning) are particularly surprising, given that the *Investigations* curriculum has long been the gold standard for engaging students in mathematical reasoning and communication.

Indicators 2g.i (materials prompt students to construct viable arguments and analyze the arguments of others) and 2.g.ii (materials assist teachers in engaging students in constructing viable arguments and analyzing the arguments of others) received scores of 1 out of 2, again at every grade level. The review implies that, if the materials or the teacher do not prompt the students to “create a viable argument” or “critique the reasoning of others”, students would be unable to do so. The curriculum is built on the guiding principle that “students have mathematical ideas”; explaining their own thinking and examining the thinking of others are habits of mind and an everyday expectation in *Investigations* classrooms.



- Throughout the curriculum teachers are supported in building a math community:
  - that is inclusive and respectful of all students
  - in which students are prepared to listen actively and contribute ideas
  - that focuses discussions on particular math ideas
  - that supports student participation
  
- Whole-class discussions are an essential feature of *Investigations 3*. Discussions provide students the opportunity to:
  - articulate mathematical ideas and develop mathematical language
  - share different approaches to solving a problem and
  - analyze why they work (or don't)
  - pose conjectures and identify evidence to support them
  - use representations to describe mathematical relationships
  - compare and connect ideas, representations, and solutions
  - consider and question each other's ideas

The extensive support throughout the curriculum, in the form of Math Practice Essays, Assessment Checklists, Math Practice Sidebar Notes, Dialogue Boxes, as well as the activities and class discussions that students engage with in every session, overwhelmingly discredits EdReports' claim that "there are few opportunities to analyze the arguments of others, either through prompts from the materials or from their teachers."

Work with the Math Practices has long been embedded into the fabric of the curriculum. *Investigations 3* continues to be on the cutting edge of math education and curriculum, integrating mathematical content and practices in ways that will best serve students in the 21<sup>st</sup> century.

## **Conclusion**

The authors of *Investigations 3* encourage current and potential users to carefully consider this review of the curriculum. It is important to note that the review shows complete alignment to the CCSS-M content standards at all grade levels, and that the review of the Mathematical Practices-Content Connections is flawed, and easily disproved.