Pearson Response to EdReports Evaluation of Investigations 3 Grades 3-5

Investigations in Number, Data, and Space® is a K–5 mathematics curriculum designed to engage students in making sense of mathematical ideas. This third edition of the curriculum, *Investigations 3*, is built on the strong foundation of the first two editions and the six major goals that have guided the development of the curriculum. The curriculum is designed to:

- support students to make sense of mathematics and learn that they can be mathematical thinkers;
- focus on computational fluency with whole numbers as a major goal of the elementary grades;
- provide substantive work in important areas of mathematics—rational numbers, geometry, measurement, data, and early algebra—and the connections among them;
- emphasize reasoning about mathematical ideas;
- communicate mathematics content and pedagogy to teachers; and
- engage the range of learners in understanding mathematics.

Our analysis of the EdReports evaluations of *Investigation 3* ©2017 shows the evaluations continue to use a flawed methodology that often produces inaccurate or misleading information about the key features of the instructional materials reviewed. The continued use of a binary rating system for the two key indicators under the Focus heading leads to the indefensible suggestion that a curriculum is either focused or it is not, a claim that most educators would overwhelmingly dispute.

The Grade 3 instructional materials received a rating of 0/4 for Criterion 1b, Indicator 1b: *Instructional material spends the majority of class time on the major cluster of each grade*. The reviewers determined that 63% of the sessions "focus on or support the major work of the grade" and the EdReports tool sets a somewhat arbitrary threshold of 65%.

Such a strictly quantitative measure fails to take into consideration the qualitative aspect of the sessions and the targeted emphasis that the *Investigations* program has on helping students develop rich understanding of the major work of Grade 3, specifically concepts around and fluency with multiplication and division, and applying these concepts to solve problems in a range of contexts.

The weakness of the tool is also evidenced in the rating of 0/2 that the Grade 4 instructional materials received for Criterion 1a, Indicator 1a: *The instructional material assesses the grade-level content and, if applicable, content from earlier grades. Content from future grades may be introduced but students should not be held accountable on assessments for future expectations*. The evidence statements provided to defend the rating of 0/2 not only reflect a less-than-robust understanding of grade-level expectations, but also suggest an incomplete view of learning progression for certain concepts.

In the second evidence statement, reviewers maintain that students are being assessed on the concept of "outliers" in an item that asks them to "consider the highest and lowest number….and the

outliers." However, teachers are specifically told that students' understanding of "outlier" is NOT to be assessed. (See Teacher Note 1 of Grade 4 Unit 2 Generating and Representing Measurement Data.) It is worth noting that the authors of the K-3 Categorical Data and 3-5 Measurement Data Progressions document suggest that starting in Grade 2, "[s]tudents might enjoy discussing and interpreting visual features of line plots, such as the "outlier" value of 69 inches in this line plot."

A Curriculum Built Around Math Practices

In *Investigations*, students' development of mathematical concepts is fostered by practices that the Common Core State Standards for Mathematics calls the Standards for Mathematical Practices. "Developing an understanding of what it means to do mathematics is fundamentally about the practices of the discipline. *Investigations in Number, Data, and Space* has always integrated in the learning sequence those core mathematical practices that focus on reasoning, communication, and making sense. This third edition of the curriculum makes more explicit the mathematical practices that have always been embedded in the materials." "Just as students have to learn mathematical content, they also need to learn how to engage in mathematical practices through targeted, intentional planned instruction. It is not sufficient to post a list of practices on the wall or have students check off when they are engaging in a particular practice." (Implementation Guide, p. 44)

This approach has been so powerful that many math educators consider the program a hallmark of effective instruction on these habits of mind. One of its most recognized strengths is the seamless integration of content and the Mathematical Practices.

In *Investigations 3*, several features were added to the program to give greater visibility to the role of the math practices in the curriculum. These include the following:

- **Mathematical Practices in This Unit Essays** In each unit is a Mathematical Practice in this Unit essay that describes two *highlighted practices* and provides examples of how teachers support students to learn about those practices. Each of the eight practices is highlighted twice at each grade. The math practices for the unit are carefully chosen because the mathematical content of the unit provides important opportunities for students to learn how to engage in that practice. When viewed collectively, across K-5, these 12 essays offer teachers an in-depth view of *each* Math Practice.

- **Math Practice Notes for Highlighted Practices** Throughout the sessions, in each curriculum unit, are sidebar notes that point out opportunities for students to engage in the highlighted mathematical practices and provide tips at point of use for how teachers can attend to these practices.

- **Math Practice Notes for Non-Highlighted Practices:** Additional sidebar notes within the sessions point out opportunities for engaging students in mathematical practices that are not the highlighted practices for the unit.

- **Highlighted Practices in Ongoing Assessment** Part of providing targeted, intentional, planned instruction in the mathematical practices is assessing students' learning. The highlighted practices are integrated into *Ongoing Assessment: Observing Students at Work* for relevant sessions.

- **Assessment checklists for the Highlighted Practices** Assessment Checklists that focus on the highlighted practices are provided in each unit. These offer a way to gauge students'

progress in incorporating the highlighted practices into their mathematics work. Like the *Ongoing Assessment* questions, these checklists show the close integration of the math content and math practices

Given the comprehensive coverage to the mathematical practices throughout the program across grades, the TERC authors and the Pearson team were surprised and confused by the ratings of the reviewers on Indicators 2f, 2gi, and 2gii.

The evidence statements for Indicator 2f: *Materials carefully attend to the full meaning of each practice standard,* suggest that either the guidelines do not provide adequate guidance to help reviewers evaluate how well the instructional material under review helps students develop proficiency with these standards or that the reviewers themselves do not have a clear understanding of how students become proficient math thinkers and problems solvers. For example, in the Grade 3 and Grade 4 evaluations, reviewers maintain that the instructional materials attend "superficially" to MP5," citing as evidence sessions in which students are using a specific tool (arrays) rather than being able to choose any tool. What the reviewers seem to not be taking into consideration is the learning that needs to take place to help students develop proficiency with MP5, *Use appropriate tools strategically*.

In order for students to use tools strategically, they need to learn about each tool: how to use it and in what kinds of problem situations it is useful. For example, in order to choose to use an array, students must have already had focused instructional time learning how the array is structured, and how to use it to solve problems. Students do not automatically understand what an array is and how it represents multiplication. This focused instruction then allows students, in later problem solving situations, to confidently choose and use a tool such as an array.

These evidence statements also suggest that the reviewers are evaluating individual, discrete events within the instructional materials rather than seeing these individual events as part of an integrated whole. When designing the curriculum, the TERC authors looked at what opportunities students have to learn about these mathematical practices at each grade level and how these different opportunities within a grade level and across grade levels help students build understanding of and develop an appropriate level of proficiency with the practices.

Across Grades 3 through 5, reviewers consistently rated the instructional materials as partially meeting expectation Criterion 2g, Indicators 2g.i and 2g.ii, both of which address MP3, *Construct viable arguments and critique the reasoning of others*. At each grade level, the respective reviewers note that "much of the student engagement in the class discussion is teacher prompted without giving students the opportunity to create their own authentic inquiry in the thinking of others." The specific evidence statements reflect a similar lack of understanding of how students learn to construct mathematical arguments and to critique the reasoning of others (MP3). In order to construct mathematical arguments, students need to learn to create sound explanations, to give clear definitions, to think logically. In *Investigations*, the development of these skills is foundational to building proficiency with this mathematical practice, making these teacher-prompted tasks integral to students' mathematical experience.