Response to PARCC's Draft Model Content Frameworks for Mathematics

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On August 3, 2011, PARCC released its Draft Model Content Frameworks for Mathematics for public comment. After reviewing the Frameworks for Grades 3-6, we have several concerns:

- The prioritizations in the Frameworks suggest a dangerous narrowing of the Common Core State Standards for Mathematics (CCSS-M);
- The scant attention to Standards for Mathematical Practice (SMPs) in the grade-level sections and the lack of useful examples about how the SMPs might be assessed undermines their significance; and
- The Frameworks' emphasis on fluency with skills misrepresents CCSS-M by marginalizing the development of conceptual understandings.

We elaborate these concerns below, along with suggestions for addressing each of them.

Concern #1:
The Frameworks' prioritizations of clusters of standards suggest a dangerous narrowing of CCSS-M. This narrowing is reinforced throughout the document.

By creating "fewer, clearer, and higher" standards, CCSS-M already significantly narrows the scope of the school mathematics curriculum. PARCC's Frameworks narrow that curriculum even further by assigning first, second, or third priority to the several clusters of standards at each grade. This re-interpretation of CCSS-M by PARCC carries significant risks.

The prioritizations will almost certainly be widely misconstrued as a signal to give certain topics cursory treatment. (This is no idle concern: Recall the misinterpretation of similar tables of topics for increased or decreased attention in the NCTM's 1989 Standards.) Boilerplate text accompanying the prioritizations states, "No material in the standards should be excluded." But when the organization writing the assessments announces what is First Priority and what is Third Priority, the conclusion many will draw is clear: Focus on the First Priority standards and don't worry about the others.

We are also concerned that a large majority of "first-priority" clusters focus on number and operations, while standards about data, patterns, and geometric reasoning are often relegated to the lowest priority status. The focus on number and operations as the highest priority is reinforced throughout the Frameworks. Every single "culminating standard" for grades 3 through 6, for example, concerns computation with whole numbers, decimals, or fractions. Measurement, geometry, word problems, and data are mentioned, but the focus is squarely on traditional arithmetic. Furthermore, the priorities exclude the Standards for Mathematical Practice. Many will assume that PARCC's assessments will track its Frameworks' priorities, and schools will adjust their curricula accordingly. PARCC has taken CCSS-M's already narrow set of standards and narrowed it further.

We are also concerned that the prioritizations will compromise the learning "trajectories" the CCSS-M authors attempted to develop across grades. For example, representing and interpreting data is listed for Grade 6 as a "Key Advance from Grade 5," but it is not a priority in grade 5 and is only a third priority in grades 3 are 4. As a result, schools are likely to dismiss this topic as unnecessary

in grades K-5, thereby not preparing students for the important data skills that are prioritized in Grade 6.

Recommendation related to Concern #1

- *Abandon the prioritizations altogether. They are unwarranted and carry significant risks of marginalizing important aspects of CCSS-M.*

Concern #2

The minimal attention to Standards for Mathematical Practice (SMPs) in the grade-level sections of the Frameworks and the absence of useful examples about how the SMPs might be assessed undermines their significance.

The CCSS-M authors made clear the importance of the SMPs. They also indicated that a key challenge in implementing CCSS-M will be advancing the state of current assessment technology to adequately assess the SMPs. The SMPs are the strongest aspect of CCSS-M; assessing them will be the most novel and difficult part of the assessment consortia's work.

Indeed, the introduction to PARCC's Frameworks pays a great deal of attention to the SMPs. This does not, however, carry over to the grade-level sections. In the grade-level sections, the SMPs are not mentioned as Key Advances or in the Instructional Emphasis tables and they are rarely mentioned in the Examples of Opportunities for In-Depth Focus. The SMPs play a central role in all these areas. Their omission from these sections belies their importance.

Most of the treatment of the SMPs in the grade-level sections comes under "Examples of Opportunities for Connecting Mathematical Content and Mathematical Practices." Unfortunately, the examples provided are not detailed enough for curricular guidance, fail to communicate the centrality of the SMPs, and give no indication about how the SMPs might be assessed. Nearly all of the "opportunities for connecting," moreover, are for connections to computational standards. In perhaps the most egregious instance, one Grade 5 example states, "To the extent that multidigit division problems take time and effort, they can also require perseverance (MP1)" (p. 13). It seems quite unlikely that the CCSS-M authors had multidigit paper-and-pencil long division in mind when they wrote their first SMP. Such treatment of the SMPs in the grade-level sections will severely limit their potential for improving teaching and learning.

The inadequate treatment of the SMPs in the grade-level sections is echoed in the Frameworks' advice about how to start implementation of CCSS-M. The Frameworks document identifies specific content at each grade level "as starting points to coordinate and concentrate efforts to transition to the standards" (p. 7). This advice ignores the SMPs, which most authorities have recommended as the *best* place to start implementing CCSS-M. PARCC's implementation advice further reinforces the impression that the SMPs are of secondary concern to PARCC. If, as the document indicates on p. 6, "Separating the practices from the content is not helpful and is not what the standards require," then specific language about SMPs must be incorporated into each section of the Frameworks, including the discussion about transitioning towards the new standards.

Recommendations related to Concern #2

- *Repeat language from the introductory section about the SMPs in each of the grade-level sections, i.e., connect the language about the SMPs in the first portion of the document with each of the grade-level content sections in the second half.*

- *Delete the "Examples of Opportunities for Connecting Mathematical Content and Mathematical Practices" sections and incorporate clear language about the SMPs into all the other sections (i.e., Example of Key Advances, Fluency Expectations, Examples of Opportunities for In-Depth Focus, Starting Points for Transition, etc.). Then include prototype tasks within each of these sections that illustrate how the SMPs will be integrated with the content standards. If sample tasks are not ready, delay the release of the Content Frameworks until they are.*

- *Tasks that assess the SMPs must include opportunities for students to communicate their solution strategies, which typically involves using numbers, words, pictures, tables, and/or graphs. Employ scoring mechanisms that are able to assess these forms of student communication.*

Concern #3:
The Frameworks' emphasis on fluency misrepresents CCSS-M by minimizing the importance of developing conceptual understandings.

Mathematics educators have long recognized the interdependence of conceptual understanding and procedural fluency. CCSS-M, for example, includes language that emphasizes the interdependence of procedural skill and conceptual understanding. This recognition is apparent in the introduction to the Draft Content Frameworks in statements such as, "It is important to provide the conceptual building blocks that develop understanding in tandem with skill along the way to fluency; the roots of this conceptual understanding often extend one or more grades earlier in the standards than the grade when fluency is finally expected" (p. 2).

In other sections of its Frameworks, however, PARCC divorces procedural fluency from conceptual understanding and seems to promote what might be called "procedures without connections to meanings." This severing of the connections between conceptual understanding and procedural fluency will ultimately undermine both.

The grade-level Fluency Expectations sections and Table 1 on page 5 give the impression that fluency, especially fluency with algorithmic procedures, is all that matters. Furthermore, because expectations for fluency are typically discussed in two sections at each grade level — "Fluency Expectations" and "Opportunities for In-Depth Focus" — discussion of procedural fluency divorced from conceptual understanding is overrepresented.

The "culminating standards" are all about computational fluency. For students to be college and career ready, mathematical practices such as problem solving, reasoning abstractly and quantitatively, using appropriate tools, and mathematical modeling must be represented as "culminating standards." Similarly, conceptual understandings such as understanding ratios (6.RP.1) and analyzing patterns and relationships (5.OA.3) should be included as culminating standards.

Including standards other than fluency as culminating standards will promote a balanced approach that recognizes that conceptual understandings and fluency with procedural skills are mutually reinforcing and that meeting the Standards for Mathematical Practice is also vitally important.

Recommendations related to Concern #3

- *Expand the Fluency Lens and Fluency Expectations sections to include conceptual understandings involved with each fluency.*

- *Concentrate grade-level discussion of fluency in the section on Fluency Expectations and eliminate such discussion from the section on In-Depth Focus.*

- *Include expectations for conceptual understanding and SMPs in the culminating standards.*

- *Delete Table 1 (p. 5).*

Other Recommendations

- *Consider assessing the SMPs using non-machine-scorable tasks that involve content from the prior grade. Such tasks could be used during Quarter 1 and Quarter 2 to assess both the SMPs and students' mastery of prior-grade content and skills.*

- *Explore the use of matrix sampling or some other sampling scheme to alleviate the need to narrow the scope of the assessment, which seems to be driving PARCC to neglect important standards in CCSS-M.*

- *A bullet on p. 9 encourages use of "excellent materials that are narrow in scope" as opposed to "settling for a single, mediocre resource that claims to cover all content." This suggestion could easily be misconstrued as encouragement to cobble together resources in a way that could lead to a disjointed, incoherent mathematics program within and across grades. We recommend deleting this recommendation from the document.*

Summary

We have identified three related areas of concern with the Draft Model Content Frameworks: a dangerous narrowing of the CCSS-M; too little emphasis on the SMPs; and an inappropriate focus on procedural fluency divorced from conceptual understanding.

Taken together, these concerns create an impression that assessments to be developed by PARCC may not reflect CCSS-M's call for a more coherent and rigorous curriculum. Rather, the Draft Content Frameworks seem to reflect a vision of a narrowed, "dumbed-down" K-6 curriculum that focuses largely on rote fluency with paper-and-pencil computation. We assume that this is not the intent of the PARCC developers. However, until the issues raised here are addressed, the Draft Model Content Frameworks will point many state, district, and school personnel in the wrong direction as they begin their transition to CCSS-M.

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