IN THE FIELD

The Curriculum Review Process: A Powerful Learning Opportunity

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Are You Able to Participate in Curriculum Adoption?
(Note from the Editorial Panel)

In this article, the authors describe the value and learnings that come from participating in a curriculum review and adoption process. However, we recognize that not all educators have this opportunity. Some districts support and seek out teacher contributions to this process, while others complete the process entirely at the central administration level. As an educator, I have been a part of both types of districts. I have been fortunate enough to have felt valued as I have participated in curriculum adoption in some districts, while I have also felt the frustration in my inability to give input or influence curriculum decisions in others. With that being said, this article presents beneficial information for all educators despite their ability to contribute to decisions. First of all, this article introduces many resources that would provide professional development opportunities for any teacher of mathematics. Second, all teachers, no matter the curriculum used or district worked for, make curricular decisions as they teach. This article provides a good framework for deciding what lessons/materials/activities/etc. are valuable and worth precious classroom time. The questions that the committee asks are questions that we should be asking on a daily basis when teaching. I hope that, as you read this article, you feel empowered to make better decisions regarding the curriculum you teach every day. - Tessa Ziser

"Adoption of curriculum materials is one of the most important decisions a teacher, school, or district can make." - Diane Briars

How do you bring a team of twenty-seven teachers and district support staff together to reach consensus in recommending math curriculum? As members of our district's math team, we began to realize the importance of Diane's statement at the outset of the curriculum adoption process for elementary mathematics. We saw this as an opportunity to build a common language and understanding not only of content and practice standards, but of effective mathematics teaching practices. In this article we describe the curriculum review process, the professional learning in which we engaged, and the outcome of our group's learning.

Session 1

As everyone gathered for the first work session, the diversity of the group was obvious: teachers representing grades K–5; representative teams from the English Language Acquisition (ELA) Instructional Practices, Student Services, Early Childhood Education (ECE), and Educational Technology; a teacher effectiveness coach; an administrative intern; and math team members. All were committed to the task of reviewing and recommending standards-aligned curriculum resources to best meet the needs of all students to achieve the Common Core State Standards–Mathematics (CCSS-M).

What Is Curriculum?

The meeting began by developing a common understanding of curriculum using "The Notion of Curriculum" (Niss, 2014). In this presentation, Niss identifies and describes six facets of curriculum within an educational setting: goals or standards, content, materials, forms of teaching, student activities, and assessment.

The Notion of Curriculum

"The curriculum can be seen as an amalgam of goals, content, instruction, assessment and materials." (Kilpatrick, 1994)

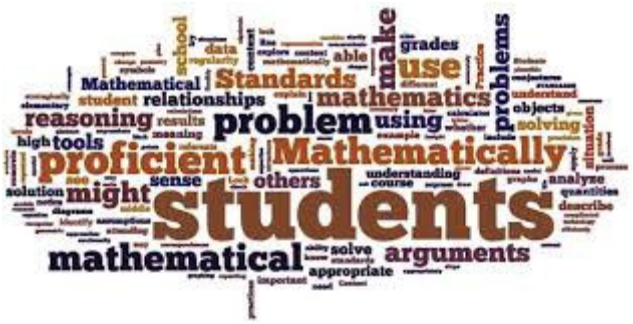
". . . we use the term curriculum broadly to include mathematics materials and textbooks, curriculum goals as intended by teachers, and the curriculum that is

enacted in the classroom." (Stein et al., 2007)

Six Facets of Curriculum within an Educational Setting:

- *Goals or Standards: overarching purpose, desirable learning outcomes, specific objectives/aims*
- *Content: topic areas, concepts, methods techniques, procedures*
- *Materials: instructional materials and resources, including textbooks and IT-systems*
- *Forms of Teaching: tasks, activities and modes of operation of the teacher*
- *Student Activities: activities of and tasks and assignments for students*
- *Assessment: goals, modes, forms and instruments of formative and summative assessment*

Committee members' conversations about this text focused on how their view of curriculum was expanded, and they identified implications for thinking about the materials to be reviewed.



How Is Quality Curriculum Identified?

The next stop in our grounding conversations about curriculum explored "Curriculum Materials Matter: Evaluating the Evaluation Process" (2014). In it, Diane Briars, National Council of Teachers of Mathematics (NCTM) President, discusses "Top Lessons Learned" during her tenure as mathematics director for the Pittsburgh Public Schools. Briars' seven key tenets about the effective evaluation of curriculum materials provided a bridge from the theory of "The Notion of Curriculum" to the practical aspects of reviewing curriculum. They included:

1. *Focus on the central evaluation question: What curriculum materials best support students' learning of the standards?*
2. *Remember that content analysis is much more than alignment.*
3. *Analyze the nature of the instructional tasks and activities—this is as important as analyzing content.*
4. *Focus initial reviews on student materials and teacher editions of the materials.*
5. *Consider equity, diversity, and access.*
6. *Recognize that all omissions or gaps are not the same.*
7. *Recognize that additional content is less problematic than gaps that are difficult to fill.*

Committee members read Diane's message and the specifics for each of the lessons learned, making note of new ideas for consideration throughout the curriculum review process. The second piece of the "What-is-curriculum?" puzzle grounded the group's conversations in the nuts and bolts of what to consider, and narrowed the focus to a discussion of the importance of quality tasks. Diane asserts that it is important to consider "how the materials support students' learning through opportunities to engage in tasks that promote reasoning and problem solving" (2014). Our group also examined several other thought-provoking statements highlighting the critical nature of choosing tasks wisely:

- "Student learning gains were greatest in classrooms in which instructional tasks consistently encouraged high-level student thinking and reasoning and less in classrooms in which instructional tasks were consistently procedural in nature." (Stein, Smith, Henningsen & Silver, 2009)
- Students' academic work in school is defined by the academic tasks that are embedded in the content they encounter on a daily basis. (Stein et al., 2009)
- Students develop their understanding of the nature of mathematics from the tasks they experience. (Stein et al., 2009)

- " . . . it is the level and kind of thinking in which students engage that determines what they will learn." (NCTM, 1991)
- Differences in the level and kind of thinking of tasks used by different teachers, schools, and districts, is a major source of inequity in students' opportunities to learn mathematics. (Briars, 2010).

Beginning the Review Process

With this foundation, the group was ready to begin its initial analysis of the curriculum using a rubric adapted from the Instructional Materials Evaluation Tool (IMET) developed by Student Achievement Partners, Achieve, and Council of the Great City Schools (CGCS) and used by states and school districts across the country (see Appendix A).

Grade-level teams explored the alignment of the curriculum to the depth and spirit of both the Common Core Content Standards and Standards for Mathematical Practice. Teams measured the content and practices of each curriculum using the following:

- Content: Quantity, pacing and placement of lessons and units
- New concepts developed on previous understandings, knowledge and skills
- Opportunities for students to connect to real-world situations and wrestle with challenging problems
- Conceptual understanding developed through questioning, multiple representations, written explanations and discussion
- Appropriate guidelines for procedural skills and fluency
    - Practices: Standards for Mathematical Practice embedded in lessons and are primary vehicle for learning
    - Standards for Mathematical Practice used to promote thinking that is rich, challenging, and useful ("habits of mind")
    - Assessments provided that demonstrate students' proficiency of Standards for Mathematical Practice

As committee members gathered data, teams created posters capturing positives and challenges (based on evidence from the curriculum—not on personal experience or preference), and presented their findings to the group. While many group members' conversations and noticings aligned with the day's learning, there were still areas where misalignment and misconceptions prevailed, specifically surrounding rigor. "Do we (the committee) have the same definition of rigor?" and "Is there a way to create a common definition of 'rigor' in order to view the materials with that shared understanding in mind?" and "Can we have a discussion with the entire group addressing rigor?" were a few of the questions that surfaced on the end-of-day feedback cards, highlighting further work needed to build and align our group's understanding of effective teaching practices. Participants left for the day with an assignment to read an excerpt from K–8 Publishers' Criteria for the Common Core State Standards for Mathematics (2012) before the next session.

Session 2

The Committee began Session 2 with a discussion of six poignant quotes from the reading assignment. We engaged in rich discussions highlighting topics from the reading: extensive work with grade-level problems, explicit attention to the specialized language of mathematics and careful consideration of each practice standard and individual standards that set an expectation of fluency. Particularly notable were conversations about the three aspects of rigor, clearly highlighting the importance of and need for creating a shared understanding of rigor for the group. So what is a rigorous task? Our group was about to find out!

Definition and Review of Rigor

Criteria for rigorous tasks were identified, and participants understood that a worthwhile, rigorous task could be described as being one that:

- Is open-ended,
- Does not have a solution path that is immediately obvious (or implied),
- Requires students to think and not just rely on memorized procedures,
- Requires students to connect mathematical skill, understanding, and reason, and

- Requires students to interpret and communicate results.

Next, committee members in grade bands analyzed grade-specific tasks from the curricula being reviewed for rigor, ranking items as being high, medium, or low rigor. Debate about the task rankings included evidence statements from the criteria and language about rigor from the K–8 Publishers' Criteria reading discussed earlier. With a more solid understanding of rigor, the group began the second round of curriculum review, continuing to use the Mathematics Grade-Level Instructional Materials Evaluation Tool (GIMET). Again, participants created posters capturing the positives and challenges, reaching consensus on a rating (yes, no, maybe) for each of the curricula.

A final review for Equity, Spanish Parity, Assessment, or Design and Usability found the committee exploring the metrics for these critical considerations, ready to share evidence that might change their grade-band's initial rating of the materials. (See Appendix A.)

At the end of the second session, committee members—based on the day's learning about rigorous tasks and publisher's criteria—articulated differences between the programs being reviewed, noting an accumulating body of evidence both for keeping and for eliminating curricula. To prepare for engaging in both a review for vertical alignment (Grades K–2 and 3–5) as well as a lesson-level view of the curricula during the next sessions, committee members' reading assignment was "13 Rules that Expire" (Karp, Bush, & Dougherty, 2014).

Session 3

A lively discussion around "13 Rules That Expire" ensued as Session 3 began! In the article, the authors outline common rules and vocabulary which teachers share and elementary school students tend to overgeneralize—tips and tricks that do not promote conceptual understanding, rules that "expire" later in students' mathematics careers, or vocabulary that is not precise (Karp, Bush & Dougherty, 2014). Committee members talked about rules they have encountered in their work as well as advantages and disadvantages for students in using such rules.

Next we watched the video "Did You Know? 2014" (Creative Thinking–University of Hawaii, Kapi'olani

Community College, 2014). This thought-provoking look at the exponential times in which we live, juxtaposed with "13 Rules That Expire" highlighted implications for both using mathematical rules in classroom work and reviewing curriculum materials. The Committee's text and video discussions highlighted the need for today's students to be savvy consumers of information and to be problem solvers with well-honed skills to use and apply both the mathematics content as well as the habits of mind (Standards for Mathematical Practice). Conversations addressed the fact that while teaching a tip or shortcut might make students' learning easier in the moment, it is not helpful to provide students with a collection of "explicit, yet arbitrary, rules that do not link to reasoned judgment but instead to learning without thought" (Karp et al., 2014). The committee vowed to be on the lookout for opportunities in the curricula being reviewed to build students' conceptual understanding instead of sacrificing understanding for procedural speed.

Definition and Review of Fluency

Before we could review the curricula for vertical alignment and coherence of models, fluency expectations for basic facts, and strategies for solving word problems, it was necessary that the committee have a common understanding of "fluency." Arthur Baroody's article "Why Children Have Difficulties Mastering the Basic Number Combinations and How to Help Them" (2006) was an optimal vehicle to provide insight into two perspectives of fluency and support us with a common lens to analyze how various curricula addressed fluency. The committee was divided into two groups for this part of the review: Grades K–2 Addition and Subtraction, and Grades 3–5 Multiplication and Division. Members were paired and used a note catcher to record find-

ings related to the guiding questions:

- What models for addition and subtraction (multiplication/division) are introduced and used?
- What strategies are used to support fluency development?
- How are students supported in solving word problems involving common addition and subtraction (multiplication/division) situations? (CCSS-M, pp. 88–89).

Following the review, the committee compared their findings across grade bands to capture the coherence of models, fluency, and strategies to solve word problems for each of the curricula. At this point in the analysis, the committee was able to recommend which curricula would continue in the review process, and which was eliminated from the review because it didn't meet the criteria described previously.

Since the upcoming session included vendor presentations, the committee was given the opportunity to write questions they wanted vendors to address in their presentations. Vendors were sent an agenda which included points to address and questions from the committee.

Session 4

The morning of Session 4 was designated for vendor presentations of the curriculum materials that the committee voted to continue to the next phase of the review process. Three vendors were slated for this session, and one vendor was scheduled to present on another date. Each vendor was given one hour to showcase their curriculum and answer the questions prepared by the committee. After each presentation, committee members broke into grade level bands (K–1, 2–3, 4–5) to debrief and capture pros, challenges, and additional questions for that particular set of materials. During the afternoon, committee members came together as a group to share the information collected during the grade band debrief sessions.

For one final learning opportunity, we read two articles—"Math Lies We Tell Students" (Graybeal, 2014) and "Rules or Understanding?"(Martinie, 2005)—emphasizing the importance of mathematical reasoning and making sense vs. using clues and viewing math as a set of rules. These text resources set the stage for Session 5's analysis of how conceptual understanding is built within each grade and over grade bands for each of the curricula.

Session 5

As we gathered for our final work day as a committee, we were filled with hope and anticipation, knowing there was more important work ahead of us: one more vendor presentation, a study of lessons focusing on conceptual understanding for each grade level in each curricula, a technology review, the final recommendation, and recommendations for professional development to support teachers and leaders with the adopted curriculum.

Again, we grounded our work for the day with professional learning focusing on beliefs about teaching and learning of mathematics. The book, *Principles to Actions*, provided a springboard into that learning. We started by analyzing "Unproductive" and "Productive Beliefs" (NCTM 2014, p. 11). Next, committee members explored two Mathematics Teaching Practices: supporting productive struggle in learning mathematics and building procedural fluency from conceptual understanding.

Final Review

This work laid the foundation for our next step: studying how each of the curricula engaged students in learning a grade-specific CCSS-M content standard. Guiding questions that focused our work included:

- What role does conceptual understanding play in the lesson? What models are used?
- How does procedural understanding follow from conceptual understanding rather than following from rules?
- How does the instructional guidance for teachers support productive beliefs about teaching and learning mathematics?
- How does the instructional guidance of the lesson support teachers to meet the expectations of the instructional indicators called out in the Framework for Effective Teaching (our district's educator effectiveness tool)?

Grade bands debriefed and created a poster to capture evidence that supported their findings. Poster

findings were shared with the whole group, and the committee discussed important points and implications for each of the curricula. To our surprise, several lessons from one of the curricula specifically taught one of the "13 Rules That Expire"!

The committee explored and reviewed the technology supports for each of the curricula, capturing the pros and challenges of the technology resources for each of the curricula on a poster to share with the whole committee.

Recommendation of Curriculum

With analysis of the curricula complete, it was now time for the committee to come to a consensus on which curriculum would best meet the needs of our students and make a recommendation for adoption. Committee members were given a ballot in which they were to respond individually to the following prompts for each set of materials:

- I fully support this curricular resource, OR
- I support this curricular resource with some reservation, OR
- I do not support this curricular resource.

After each statement, members were asked to provide reasons for their responses based on evidence uncovered through our process. Ballots were tallied and the results indicated an overwhelming consensus that two curricula were viable options for adoption.

Our last task for the committee was to brainstorm recommendations for professional development structures and venues that would support teachers and school leaders with their learning around the two curricula options.

Reflections of the Process

In closing, we asked the committee members to reflect on the process that guided our curriculum review work. We were impressed with each person's dedication and willingness to follow the process and allow themselves to be open to new learning. Here are a few of their comments:

> "In order to provide a fully informed recommendation, each step of this process was meaningful and necessary. There were many layers to each set of curriculum resources that needed to be effectively uncovered. The struggle was productive and engaging."

> "I'm taking away a profound difference in the way I see teaching of mathematics. I leave feeling validated about my own beliefs yet determined to continue these conversations to help me grow. I thoroughly enjoyed this process. It helped me expand my thinking."

> "This opportunity helped me deepen my math understanding. It also gave me a new way to look at the curriculum or materials that I will potentially use in my classroom to make sure they are sound/strong materials that support teaching and learning."

> "I'm taking away a new lens in which to analyze materials. The depth needed to truly understand a curriculum is more than I knew. All of the professional readings were critical to this work and applicable to my instruction. I feel empowered to change my teaching for the better."

> "I loved it! Thinking about a curriculum critically, being open-minded to alternative perspectives. Learning about best practices in math—both teaching and student learning."

Conclusion

Diane Briars was right—curriculum materials do matter! What began as a daunting task—the review process for adoption of mathematics curriculum—quickly became an opportunity for professional

learning and deepening everyone's understanding of effective mathematics teaching and learning! Here is our Top Ten List of Lessons Learned:

#10: Use and adapt high-quality rubrics and resources, such as the IMET and GIMET; don't try to reinvent the wheel.

9: Look for opportunities to make connections

to educator effectiveness—whether it's through a formal evaluation tool or by looking specifically at effective teaching and learning of mathematics.

8: Throughout the process, continue to require that evidence is based on rubrics rather than feelings.

7: Ensure enough facilitators to lead small group discussions.

6: Be intentional to pair those with strong math backgrounds with other committee members throughout the review.

#5: "Experts" from other departments (English Language Acquisition, Student Services, Early Childhood Education, Education Technology, etc.) bring depth to the analysis, providing insights regarding how the curriculum might or might not support all students.

4: Use feedback—observations, "exit tickets"—from each session to strategically plan for the next session(s).

#3: Group and regroup committee members with various partners throughout the process, providing collaboration opportunities with different people to hear all voices.

#2: Grounding discussions in professional readings is key in building understanding for all committee members.

AND THE NUMBER ONE LESSON LEARNED FROM THE CURRICULUM PROCESS IS:

#1: Of utmost importance is looking at materials multiple times in multiple ways as reviewers deepen their understanding of quality materials.

Nonie Lesaux (Harvard Graduate School of Education) said it best, "We can't confuse curricular materials with good teaching, but we can support good teaching with high quality, comprehensive curricular materials." The curriculum review process in which we engaged not only identified high quality, comprehensive curricular materials, but also provided a powerful professional learning opportunity to support effective mathematics teaching.

Authors note: *Laura Neuberg and Juli Lenzotti are members of Denver Public Schools' Math Department, directed by Cathy Martin. Under Cathy's leadership, the curriculum adoption process—for middle school mathematics curriculum last year and elementary (K–5) curriculum this year—is clearly a professional development opportunity for everyone involved.*

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Appendix A: K–5 Math Materials Evaluation Tool

Section II: Critical Criteria		
N (not found)--Materials do not support this criteria. L (low)—Materials contain limited support for this criteria but support is not embedded or consistent within/across grades M (moderate)—Materials contain support for this criteria but support is not embedded or consistent within/across grades. H (high)—Curriculum materials contain embedded support for this element that is consistently present within/across grades.		
Criteria	Metrics	Notes & Score
3) Equity	3a) Materials provide teachers with strategies for meeting the needs of a range of learners. 3b) Materials provide instructional support to help teachers sequence or scaffold lessons so that students build understanding from previous knowledge. 3c) Materials provide opportunities for teachers to use a variety of grouping strategies. 3d) Materials embed tasks with multiple-entry points that can be solved using a variety of solution strategies or representations. 3e) Materials suggest scaffolds for English language learners that will support their regular and active participation in learning mathematics. 3f) Materials provide opportunities for advanced students to investigate mathematics content at great depth.	Score: _____
4) Spanish Parity Materials of comparable quality are available in Spanish.	4a) Materials are packaged and presented in Spanish in equal quality and format and meet the criteria for math content and practices. 4b) Teacher resources provide teaching scripts, prompting and reinforcing in Spanish, using Spanish academic language. 4c) Materials support math instruction and Spanish language development. 4d) Materials include explicit opportunities for the transfer of concepts and language to support the development of biliteracy. Spanish and English materials are aligned in order to allow for strategic language instruction.	Score: _____
5) Assessment	5a) Materials provide strategies for teachers to identify common student errors and misconceptions. 5b) Materials assess students at a variety of knowledge levels (e.g., memorization, understanding, reasoning, problem solving). 5c) Materials encourage students to monitor their own progress. 5d) Materials provide opportunities for ongoing review and practice with feedback related to learning concepts and skills. 5e) Materials provide support for a varied system of on-going formative and summative assessment. 5f) Assessment materials are available in Spanish. 5g) Materials provide multiple ways to show proficiency: i) multiple opportunities for written responses; ii) performance tasks and projects; and iii) multiple ways to represent understanding of concepts (including enrichment opportunities).	Score: _____

6) Design and Usability of Resources	6a) Materials include clear and sufficient guidance to support teaching and learning of the targeted standards. 6b) Materials are easy to use and cleanly laid out for students and teachers. 6c) Materials address instructional expectations and contain clear statements and explanation of purpose, goals, and expected outcomes. 6d) Materials can be reasonably completed within a regular school year and provide clear guidance to teachers about the amount of time each lesson/activity might reasonably take. 6e) Manipulative materials and disposable materials (e.g., dri-erase markers) are priced competitively.	Score: _____
7) Electronic/Online Resources	7a) Materials integrate technology such as interactive tools, virtual manipulatives/objects, and dynamic mathematics software in ways that engage students in the Mathematical Practices. 7b) Materials include opportunities to assess student mathematical understandings and knowledge of procedural skills using technology. 7c) Materials include teacher guidance for the mindful use of embedded technology to support and enhance student learning. 7d) Materials support differentiation for individual student needs, strengths, and interests. 7e) Resources are user-friendly and interactive and have an easy-to operate interface.	Score: _____