

May 12, 2005

NOTE TO HILDA ORTIZ:

StandardsWork is pleased to provide you with the results of our analysis of data submitted by the textbook evaluation teams for Mathematics. This analysis culminates in a recommendation of texts for adoption by the District of Columbia Public Schools as you go about the critical work of implementing the newly adopted standards in the classroom. While we understand there are cost considerations that must also drive the decision – and our recommendations are completely unencumbered by those factors – we believe that the combined input from stakeholders (who served on the evaluation teams), research, and experiences in the field which we site below, makes a case for the choices and decisions we present.

In arriving at these recommendations, we carefully scrutinized the scores in each of the seven categories provided to the evaluators vs. simply relying on the overall averages. Using overall averages was a legitimate strategy for generating the “short list” upon which the requests for “best and final offer” were made, but wouldn’t be fine-grained enough for a final decision. The categories include:

- *Alignment with DCPS Standards, Current Research, Best Practices in Reading Instruction and Identical Assessments* (covers standards and represents concepts and skills accurately, provides a variety of problem solving contexts, guides interpretation and reasoning, encourages students to communicate reasoning, provides mathematical connections).
- *Organization and Structure* (logical and strategic program organization, worthwhile tasks, technology integration).
- *Relevance to Student Work and Needs* (conveys lesson and unit purpose, specifies prerequisite knowledge, engages and supports students).
- *Teacher Support* (alerts teachers to commonly held student ideas, assists teachers in understanding level of student understanding, establishes standards-based classroom learning environment, demonstrates/models procedures, provides teacher content support).
- *Supplementary/Ancillary Material* (addresses the needs of diverse learners).
- *Assessment* (aligns assessment to DC standards, provides practice).
- *Professional Development Training* (provides relevant professional development)

As you will note, whereas there were two selections in reading, there are 11 separate selections in math. We found that the teachers' top selections tended to move back and forth between publishers and between traditional and non-traditional textbook series. Choosing a different text level-to-level and course-to-course could leave DCPS teachers and students confused and unsettled. Coherence, we believe, is most critical - so we have stepped back from each individual selection to look at a pathway that will make sense from pre-k to grade 12. Reflecting the standards, and for purposes of the textbook selection, the grades can be broken into two sections: grades pre-k through 8 (elementary and middle school) and then the algebra through calculus courses (predominantly high school).

Before we identify the two pathways DCPS might consider in selecting its math textbooks, we are compelled to provide a cautionary note about the task at hand. Just as the teacher evaluators went back and forth between selecting traditional and non-traditional series, math experts – and we spoke with over twenty in the course of conducting this analysis – will do the same thing. Suffice it to say we have renewed respect for districts and states that have effectively “navigated” their way through these “math wars”; we encourage the district not to sell short the arguments on *both* sides of this debate.

Below we present two “pathways” - a traditional and non-traditional one - for the elementary to middle school sequence. We have provided a rationale – and a recommendation for a best text that is defensible based on the evaluator scores – for both pathways. While we are happy to continue to lend our advice on this decision, we are not in the best position to make a hard recommendation between the two approaches; there is simply too much to consider to which we are not (appropriately so) privy, chiefly, the amount of resources available for professional development and the fervor with which the superintendent and his instructional leaders feel about one approach or another. A strong commitment will be needed about the selection; and it is safe to say that a *stronger* commitment will be needed if the non-traditional pathway is selected.

## ELEMENTARY AND MIDDLE SCHOOL SELECTIONS<sup>1</sup>

### Recommendation #1: Non-traditional Pathway

- The Wright Group/McGraw-Hill - *Everyday Mathematics* (Ranking #1)<sup>2</sup>
- Grades 6-8: Pearson Prentice Hall – *Connected Mathematics* (Ranking #3)

#### Rationale for adopting the Non-traditional Pathway:

1. *Everyday Mathematics* and *Connected Mathematics* materials are often perceived as the best of the non-traditional genre. While they are under attack from those promoting the traditional pathway, they have broad support.
2. While the battle wages between those advocating a traditional math sequence and those advocating a non-traditional sequence, most agree that in the hands of skilled and willing teachers, with an abundance of professional development and close supervision, *Everyday Mathematics* is an excellent resource. Many private schools in and around the DC area are using *Everyday Mathematics*, including Sidwell Friends and the Barnesville School of Maryland, to whom we have spoken. Even a reviewer for Core Knowledge who decided against *Everyday Mathematics*, said, “Knowledgeable teachers, well grounded in the materials, may be able to pull it off; at least it’s clear from the assessment book that there are some things that the children are supposed to know. There is almost no routine practice, although a small amount is built into the activities. . .”<sup>3</sup>
3. If *Everyday Mathematics* is selected, *Connected Mathematics* would be the obvious choice to continue and build upon the non-traditional sequence, and it ranked well among the teacher evaluators.
4. Districts using non-traditional texts are reporting gains. Boston, e.g., adopted TERC (another non-traditional sequence) and they have had a 24 point gain in MCAS scores for fourth graders since they implemented the textbook series five years ago. Lancaster, PA, using *Everyday Mathematics*,

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<sup>1</sup> Note: While separate texts were evaluated for pre-K only, DCPS teachers also evaluated series including the grade span pre-k-6. Thus, we believe it makes the most sense to have students start their educations with the same text series they will encounter in subsequent grades and since the textbook series recommended has a strong pre-K program, there is no reason to introduce a different series and every reason to keep texts consistent.

<sup>2</sup> Rankings indicated throughout the document are those that resulted from the evaluations submitted by DCPS teachers who participated on the evaluation teams.

<sup>3</sup> Core Knowledge Foundation, *An Evaluation of Selected Mathematics Textbooks*.

has experienced exciting results closing the achievement gap between its minority and white student populations. Pittsburgh and Dallas have experienced gains as well.<sup>4</sup>

5. DCPS has started down the non-traditional pathway already and schools that have implemented this approach are experiencing success. Several high-achieving elementary schools are already using *Everyday Mathematics* including elementary schools such as Mann, Murch and Eaton among others. Springboard is a project-oriented (non-traditional) supplement that currently is in use in middle and high schools across the district and to which students are responding. This experience provides DCPS with a ready source of professional developers to assist in its implementation across the district.

#### Conditions Necessary for Successful Implementation:

1. Everyone we spoke to, even those who are huge fans of the non-traditional programs and are beginning to see results in large urban districts, urge that a careful roll-out and phase-in of a non-traditional sequence is crucial. The districts that are experiencing success have implemented K-2 in the first year and then added a grade every year thereafter. (We are certain there exist other successful rollout schemes; the point is to be strategic about implementation.) Those schools that have already implemented a non-traditional sequence or where there is staff who have had experience with a nontraditional sequence would need not wait. If this is the direction that DCPS chooses, we would highly recommend that you speak to districts such as Pittsburgh and other urban school districts to learn from their mistakes and successes.
2. The critics of *Everyday Mathematics* will say that “you’ll spend the rest of your days in professional development” and even fans of the program say that if you’re not prepared to make a significant investment in robust professional development programs for teachers and principals, you should not take this approach. And, it is more than just dollars; it is coaches and other hands-on human resources to closely monitor implementation in classrooms. In Boston, e.g., they hired 25 math coaches and received a \$5 million grant from NSF on top of spending millions of their own professional dollars on implementation. (All of this is further fuel for the argument that a strategic phase-in makes sense.)

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<sup>4</sup> Conversations held with Linda Davenport of Boston School District, Diane Briars with the Pittsburgh Board of Education, and Sue Eddins of NCTM and former math chair from the IMSA.

3. Fairly or unfairly, mathematicians advocating for a traditional sequence have tagged *Everyday Mathematics* and *Connected Mathematics* as “fuzzy math” and thus the adoption of this text by high profile urban districts has been highly controversial (see press from the spring 2003 when newly installed Chancellor Joel Klein did it in New York City). If DCPS selects *the non-traditional texts* for use district-wide, it must be prepared to withstand the “heat,” as it is likely to find itself in the position of having to spend political capital, energy, and time defending the choice.
4. Teachers have to embrace the non-traditional sequence, as with any new direction it requires vast amounts of dedication and lots of hard work. Baltimore, for instance, backed away from using *Everyday Mathematics* as it was determined the teachers just didn’t have the background to implement it.
5. Supplementing the nontraditional sequence with specific skill and drill work and added emphasis on procedural proficiency is essential. This was confirmed by the DCPS principal at Murch Elementary. It is a weakness in the nontraditional sequence that is easily countered, by supplementing the lessons.

#### Recommendation #2: Traditional Pathway

- *Houghton Mifflin* Pre-K to 5 (Ranking #4)<sup>5</sup>
- *Glencoe/McGraw-Hill - Mathematics: Applications and Concepts* (Ranking #1)

#### Rationale for Traditional Sequence:

1. Not a touchstone for either side of the math wars, DCPS is much less likely to have to spend time and energy on defending its choices for the *Houghton Mifflin* and *Glencoe/McGraw-Hill* series as they are more traditional. It is important to note, however, that these are not top choices of the traditionalists either. They would prefer Saxons (scores by DCPS teachers were variable) and the Prentice Hall Algebra series.
2. *Houghton Mifflin* was rated highly by DCPS teachers, so it enjoys support. While it was rated in the number four spot overall (tied with the Scott Foresman’s series), it was actually preferred over *Trailblazers* and *Everyday*

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<sup>5</sup> Please note that Saxon Mathematics pre-k – grade 5 series scored a point higher but only Kindergarten was reviewed. The grade 3 Saxon reviews were very low.

*Math* by half of the reviewers who reviewed both series. The overall average for *Trailblazer* (which scored third) is only two points ahead of the *Houghton Mifflin* series.

3. *Houghton Mifflin* scored equivalent to the third ranked *Trailblazers* in the important category of professional development; it has stronger ratings in two categories: Supplementary Materials which deals with delivering effective lessons, specifying prerequisite knowledge, and engaging and supporting students and Assessments which deals with the alignment of tests to DCPS Learning Standards and providing students with adequate practice. Moreover, three of the eight reviewers preferred it to the top rated *Everyday Mathematics*.

*Houghton Mifflin* Mathematics is thought to contain mathematical depth sufficient that a student who masters the material will be well prepared to move on to the next level. An earlier edition of an earlier series appears on California's approved list of texts which is important for two reasons: 1) this certifies that it is a more traditional text given California's selection process and 2) this means that alignment will be strong as the Massachusetts standards, while not identical, soundly reflect the California's standards. Here are some highlights about *Houghton Mifflin*<sup>6</sup>:

- Sequential organization of the mathematics program provides an excellent structure for what students should learn each year and allows teachers to convey the mathematics content efficiently and effectively.
- The program contains numerous teacher support materials with suggestions and examples of how teachers can implement a standards-based mathematics program.
- The program contains multiple measures to assess student progress. These measures reveal students' knowledge of and ability to apply mathematical concepts and skills.
- Support is given for skill practice outside the classroom.

The middle school choice (*Glencoe/McGraw Hill* series), reflects a high level of content and a mix of instructional strategies. The feeling is that it can lead to sound preparation for students.

4. *Glencoe/McGraw Hill* Mathematics was the leading candidate for DCPS reviewers in the "middle school math" grade span, with a score of 97.

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<sup>6</sup> California State Board of Education, 2001 Mathematics Adoption Report, January 2001

### Necessary Conditions for the Traditional Sequence:

1. While many schools in DCPS are currently using more traditional texts, given achievement levels, it is evident that professional development - and lots of it - is still needed if the traditional pathway is selected.
2. For top students, the level of mathematics in both the *Houghton Mifflin* series and the *Glencoe/McGraw Hill* Mathematics will need to be supplemented and augmented, as this series is considered more appropriate to students of mid- and lower-level academic preparation who need to catch up. (Given that the most pressing issue for DCPS is to address students who are lagging behind their national counterparts, the fact that these texts are particularly good at addressing the needs of mid- and lower-level students is appropriate.).

### COURSE RECOMMENDATIONS

#### Algebra:

- Pre-Algebra: McDougal Littell *Pre-Algebra* (Ranking #1)
- Algebra 1: McDougal Littell, *Algebra 1 Concepts and Skills* (Ranking #2)
- Algebra 2: Glencoe/McGraw-Hill – *Algebra II and Trigonometry*

The McDougal Littell Series for pre-algebra is ranked #1. The McDougal Littell series for Algebra is ranked #2 . (The top rated Glencoe series was rated by only one person, and the comment attached to his review states, "I was somewhat disappointed. This is much too dense a book for a "concepts and applications" text.") Moreover, the McDougal Littell algebra text is lauded by several national experts who serve on the NAGB/Achieve, Inc. panel looking to revise the mathematics NAEP frameworks. For Algebra 2, the best series to follow the McDougal series is the Glencoe/McGraw Hill. The Algebra 2 McDougal Litell series was rated too low to consider.

#### Geometry:

- Glencoe/McGraw Hill – *Glencoe Geometry* (Ranking #1)

The DCPS reviewers gave high marks to this text – almost perfect scores across- the-board. Besides its many strengths regarding alignment with

the DCPS standards, teacher and student support, and sound organization and structure, one reviewer commented on the richness of the supplemental material that were available to reach all levels of learners far beyond what was available from the other books. Another reviewer commented on the concept maps previewed on page 199 and stated, "This is a very impressive text."

Probability and Statistics:

- Probability & Statistics I: Pearson Prentice Hall – *Elementary Statistics* (Ranked #3)
- Advanced Probability & Statistics: Pearson Prentice Hall – *Stats: Modeling the World* (Ranked #1)

Again to ensure coherence, the recommendation here is to go with the Pearson Prentice Hall Series as the Advanced Probability book is highly rated and lauded by professors who teach the subject. Moreover, Prentice Hall is the only publisher that had top ranked books at both the Elementary and Advanced levels.

Calculus:

- Pre-Calculus: Pearson Prentice Hall *Precalculus* (Ranking #3)
- Calculus Regular & AP: Pearson Prentice Hall, 2003 Series– *Calculus: Graphical, Numerical, Algebraic* (Ranking #2)

In Calculus, the deciding factor here was the AP book. This book was a finalist in the Purdue University adoption process. It was considered a fine book and one that would prepare students well for post-secondary work. A DCPS reviewer stated, "Text is very well aligned with the topics outline and philosophy for AP Calculus." Again, for coherence, the two Prentice Hall selections are recommended. A reviewer of Key Curriculum Press (the #1 ranking) stated, "Alignment with standards is strong, but some Algebra topics are not as thoroughly treated as standards imply (PC.P.1, PC.P.7, PC.P.5)." Moreover, an older version of the pre-calculus Prentice Hall text is currently used in DCPS, so this will be familiar to teachers.

Thank you for giving us the time to complete the analysis; and please let us know how we can help you further in making your decision(s).

Sincerely,

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