

Florida’s Answer to “A Mile Wide and an Inch Deep:” Mathematics Content Standards that Allow Time for In-Depth Teaching and Learning

Robert C. Schoen and J. Todd Clark

The Florida Department of Education (FL DOE), with the advice of educators from all aspects of mathematics education across the state, identified that the state had been sending the following message to K-8 mathematics teachers with the 1996 standards: cover 83 mathematics topics in each grade. Now that message has changed. The message that teachers should receive from the 2007 Sunshine State Standards is this: teach the smaller number of grade-level appropriate topics and teach them in-depth for long term learning and understanding; use the extra time to incorporate modeling, problem-solving, student justification, cooperative learning, and appropriate uses of technology to encourage students to think critically about mathematics problems, explore connections between mathematical concepts and representations, and explain their mathematical reasoning and actions.

The 2007 Grades K-8 Sunshine State Standards for Mathematics

The 2007 revision of the Sunshine State Standards for mathematics contains an average of 18 benchmarks per grade-level for grades K-8 (See Table 1). This is considerably different from the previous set of grade level expectations which averaged 83 per grade level. Reduction in the number of benchmarks at each grade level is accomplished, in part, by eliminating the repeat of identical grade level expectations found across some grade levels in the 1996 Sunshine State Standards for mathematics. In the 2007 document, there are no identical benchmarks at different grade levels.

Table 1. Comparison of Number of 1996 K-8 Grade Level Expectations and 2007 Sunshine State Standards Benchmarks

Grade Level	Number of <u>Old</u> GLEs	Number of <u>New</u> Benchmarks
K	67	11
1st	78	14
2nd	84	21
3rd	88	17
4th	89	21
5th	77	23
6th	78	19
7th	89	22
8th	93	19

One desired effect of this organization of mathematics curriculum is to enable a sixth grade teacher, for example, to expect that his or her students enter the 6th grade having mastered adding and subtracting fractions and decimals in a variety of contexts, a fifth grade Big Idea in the 2007 Sunshine State Standards. This is a bold goal, but it is achievable. As drafts of these standards were shared at public hearings throughout the state in the Spring of 2007, a fifth-grade teacher in one district stated, “I have read the draft standards for grade five, and I could cover that material before the Christmas break.” Clearly, teachers accustomed to covering a great deal of material in a relatively short period of time will need to adjust instruction to support an in-depth approach to teaching focused topics.

Teachers are expected to use the additional class time to focus on the smaller number of benchmarks and ensure that students understand them and are proficient with those topics prior to advancing to the next grade level. This permits Florida teachers to become master teachers of the mathematics concepts in their grade levels. With more time to teach each mathematics concept, teachers will have time to help students move from concrete examples and manipulatives, to multiple representations, and finally to abstract representations and more robust understanding. This change is intended to allow teachers to introduce complex, challenging mathematics problems in their classes, to teach to mastery, and to connect important mathematical concepts instead of just covering a larger number of concepts.

The 2007 Sunshine State Standards for Mathematics: Grades 9-12

The number of benchmarks for mathematics courses taught in high school has increased relative to the number of standards for 9-12 in the 1996 Sunshine State Standards. This change will better allow high school course description writers to define the mathematics concepts that make up high school mathematics courses and promote consistent core content throughout Florida high schools.

There are several key components of the new grade 9-12 standards that make them different from the previous 9-12 standards. The 9-12 standards are organized into Bodies of Knowledge. ***Bodies of Knowledge do not comprise courses.*** These Bodies of Knowledge represent a collection of mathematical concepts from which course descriptions can be written. For example, the Algebra Body of Knowledge includes standards which may be included in pre-Algebra, Algebra 1, Financial Literacy, or Advanced Mathematical Topics courses. Likewise, an Algebra 1 course may include some benchmarks from Bodies of Knowledge other than Algebra, such as Geometry or Statistics. Second, the Florida Department of Education will not write course descriptions for Advanced Placement, International Baccalaureate, or Advanced International Certificate of Education courses based on the Sunshine State Standards. Instead, these course descriptions will be based on the syllabi from the host organizations, such as the College Board.

The greater number of standards for grades 9-12, relative to the 1996 Sunshine State Standards for mathematics, will help to accomplish several objectives. One objective is improved equity. Trigonometry courses, for example will be expected to address the same core content statewide. Previously, Florida did not have benchmarks or guidance for Trigonometry, which enabled a large discrepancy in the quality of content in Trigonometry courses offered in different schools across the state. Another objective is improved clarity of content for the purposes of creating instructional materials. A third objective is to decrease unnecessary overlap of topics between courses, leaving more time to delve into course-appropriate concepts. A fourth objective is to clearly define content for upper-level capstone mathematics courses such as Precalculus, Discrete Mathematics, or Financial Literacy for students who are now required to earn four credits in mathematics for graduation.

An Era of Standards and Curriculum Research

Many positive developments have occurred in Florida since the state Board of Education adopted the first Sunshine State Standards for mathematics in 1996. Statewide, student scores on the Florida Comprehensive Assessment Test for mathematics (FCAT) have steadily increased (FL DOE, 2007a). This increase in Florida students' mathematics proficiency is also reflected in the National Assessment of Educational Progress (NAEP). Florida fourth graders steadily improved their performance on the NAEP exam, from scoring below the national average in 1996 to above the national average in 2005 and 2007 (Kersaint & Dogbey, 2007; NCES, 2007). As of 2007, the eighth-grade Florida NAEP scores are still below the national average, however they are increasing and the gap is narrowing. Florida was one of only seven states with a significant narrowing of the achievement gap between white and black eighth-grade students in mathematics between the 2003 and 2007 NAEP exams (NCES, 2007). With the help of these standards, many

failing schools have been identified and been provided with additional resources that have resulted in improved student achievement and more equal access to education for Florida students. Students not achieving proficiency in mathematics are identified through state exams and provided additional learning opportunities in mathematics. These increases in student achievement were enacted by the collective efforts of mathematics teachers across the state and made possible, in part, by the existence of the 1996 Sunshine State Standards for mathematics.

During the eleven years since that first set of Florida mathematics content standards were adopted, much research on mathematics curriculum has been published, promoting extensive discussion about mathematics curriculum in the United States, Florida, and the rest of the world. Students in Japan, Singapore, and Finland are consistently outperforming students in the United States on international examinations in mathematics (Schmidt, Houang, & Cogan, 2002). Additionally, research consistently shows that students accomplish more in a classroom with high expectations than in one with lower expectations (Cooney, 1999; Dolejs, 2006; Lopez, 1997). This research provides an impetus for revised mathematics content standards with increased rigor and coherence.

The structure of the 1996 Sunshine State Standards for mathematics was largely based upon guidance offered by the National Council of Teachers of Mathematics' (NCTM) *Curriculum and Evaluation Standards for School Mathematics* (1989), which organized content by grade bands K-4, 5-8, and 9-12. Florida's 1996 *Standards* were organized into K-2, 3-5, 6-8, and 9-12 grade bands. In 1999, in response to requests from teachers for more specificity, the grade level expectations were written for Florida standards. In 2000, NCTM published a compilation and revision of their first three *Standards* documents, entitled *Principles and Standards for School Mathematics*. In this 2000 document, the content standards were organized into K-2, 3-5, 6-8, and 9-12 grade bands. In 2006, NCTM published their most recent curriculum guide for elementary and middle grades school mathematics, entitled *Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics: A Quest for Coherence* (NCTM, 2006). This document, written for PK-8, organizes content by grade-level and into three Big Ideas and some connecting ideas at each grade. All of these documents and the associated research guided the 2007 revision of the Florida state mathematics standards to improve the clarity, coherence, and rigor of the intended mathematics curriculum in our state.

Revising the Sunshine State Standards for Mathematics

In September 2006, a group of mathematics educators (including K-12 mathematics teachers, teacher educators, mathematics supervisors, and mathematics professors) met in Tallahassee, Florida, to establish a framework for revising the Sunshine State Standards for K-12 mathematics. This committee was deemed the *framers*.

Dr. Jane Schielack, the chairperson of the NCTM group that wrote the *Curriculum Focal Points*, presented this document to the framers. Also presenting were representatives from Achieve, the Center for the Study of Mathematics Curriculum, the U.S. Department of Education, and the mathematics department at Stanford University.

These researchers conducted critical analyses of the Florida mathematics standards and presented their analyses to the framers. Various groups, including the College Board, the Fordham Foundation, and the Center for the Study of Mathematics Curriculum at the University of Missouri, rated the 1996 Florida mathematics content standards relative to other states. According to the criteria set by these organizations, the Florida mathematics standards were consistently rated poorly. Information shared by these researchers made it clear that Florida led the nation (and perhaps the world) in the number of mathematics concepts required to be taught at each grade level (FL DOE, 2007b). In contrast, countries with top scores on international mathematics examinations, such as Singapore, introduce about 15 new mathematics concepts at each grade level (Ginsburg, Leinwand, Anstrom, Pillock, & Witt, 2005). These invited curriculum researchers criticized the large discrepancy in the number of mathematics concepts assigned to each grade level in the Florida standards and in the standards of the highest achieving countries and states on different mathematics tests.

The framework for the 1996 Sunshine State Standards for mathematics was based upon the body of research in NCTM's 1989 *Standards* document. The results from the NAEP and the FCAT examinations indicate that Florida students have demonstrated achievement gains in mathematics. This seemed to indicate that the NCTM *Standards* documents have served as an effective guide for the state mathematics curriculum in Florida.

In an effort to incorporate the lessons learned from other state and international mathematics content standards, the framers listened to the panel of experts, used their own expertise, and provided the following charge to a group of mathematics curriculum supervisors, classroom teachers, and other mathematics educators, deemed the *writers*, who would draft the 2007 Sunshine State Standards for mathematics:

- Use the *Curriculum Focal Points* as the main document for developing the K-8 mathematics content standards. The K-8 standards should be written by grade-level.
- Use the Massachusetts, California, and Indiana mathematics standards as guides for writing the secondary mathematics content standards. The 9-12 standards should be more related to courses; it is not necessary for them to be grade-level specific.
- Write new content standards that are clear, concise, and increase in rigor as students move from grade-level to grade-level.
- Provide remarks and examples, where possible, to clarify the content standards and make them more “user-friendly” for teachers, students, and parents.

The results of the work of the framers, the writers, and hundreds of reviewers from across the state are evident in the mathematics Sunshine State Standards document that was adopted by the Florida Board of Education on September 18, 2007.

This phase in the evolution of mathematics standards in Florida is meant to provide a framework to take the good mathematics teaching and learning that is evident in Florida and allow it to blossom into something even better. In order for this change to take effect, appropriate modifications must be made, not just in the state content standards but at all

levels in Florida’s mathematics education system. These changes and improvements will require a collective effort from all stakeholders.

Moving Forward: Florida Teachers Hold the Key

We all share a dream to create a more mathematically literate society. As a mathematics educator, you hold the key to making this dream become reality. As leaders in your schools, you can focus on the changes in the Sunshine State Standards that empower you and your students. Our students can and should learn mathematics in a deeper, richer, and more meaningful way than they ever have. The improvement process does not happen overnight, but it is happening, and it can continue to progress.

One important way to improve teaching is to foster a professional learning environment for you and your colleagues in your daily workplace where you can learn proactively from each other. Continued improvement in teaching and learning mathematics in our state requires collaboration among peer teachers at the school level. Deliberate and intentional collaboration among teachers is known to improve teaching and learning (Cochran-Smith & Lytle, 1999).

Encourage teachers in your school or department to work together. Create homework, exams, and grading rubrics together; grade homework and exams together. This will create a more consistent message to students at your school about what it means to know and do mathematics. Plan lessons together and observe each other teaching the lessons; provide constructive feedback for improvement based on evidence-based best practices. Observing the classroom while others teach will allow you time to focus on the comments and understanding of individual learners rather than having to focus on classroom management. Meaningful and focused collaboration will increase your knowledge about mathematics, about teaching, and about learning. Learning is a lifelong endeavor, and cooperative learning is not just for students in the classroom.

Encourage your peers to join professional teaching organizations and read professional literature on teaching. Seek opportunities to attend mathematics institutes, workshops, and conferences, such as the annual Florida Council of Teachers of Mathematics' (FCTM) meeting. Read journal articles that share ideas about effective classroom practice. This larger-scale collaboration will bolster your daily professional learning environment. As teachers become more knowledgeable, students learn more mathematics in deeper and richer ways.

Conclusion

The major changes to the 2007 Sunshine State Standards include a reduced number of topics for K-8 grade levels and increased guidance for the content of high school courses. The development of the Sunshine State Standards, written by dozens of educators from across the state and reviewed and edited by hundreds of stakeholders, continues a movement toward improved school mathematics learning. Teachers are more interdependent in this new system of reduced overlap of topics from grade to grade. We encourage teachers to use this interdependence to collaborate and share knowledge and skills. Let the 2007 revisions of the Sunshine State Standards for mathematics provide a

rallying point around which to gather to improve mathematics teaching and learning in the state of Florida.

References

- Cochran-Smith, M., & Lytle, S. (1999). **Relationships of knowledge and practice: Teacher learning in communities.** *Review of Research in Education*, 24, 249-305.
- Cooney, S. (1999). Education's weak link: Student performance in the middle grades. Available: <http://www.sreb.org>.
- Dolejs, C. (2006). *Report on Key Practices and Policies of Consistently Higher Performing High Schools*. Washington, DC: National High School Center.
- Florida Department of Education. (2007a). Florida Comprehensive Test Reading and Mathematics Scores. Retrieved on October 17, 2007 from <http://fcats.fldoe.org/fcainfopg.asp>.
- Florida Department of Education. (2007b). Resource page for Florida mathematics standards. Retrieved on October 23, 2007 from <http://etc.usf.edu/flstandards/math/resources.html>.
- Ginsburg, A., Leinwand, S., Anstrom, T., Pillock, E. & Witt, E. (2005). *What the United States can learn from Singapore's world-class mathematics system (and what Singapore can learn from the United States): An exploratory study*. Washington, DC: American Institute of Research.
- Kersaint, G., & Dogbey, J. (2007). Florida's fourth grade student achievement: A comparison with the nation. *Dimensions in Mathematics*, 26(2), 48-54.
- Lopez, Frederick G. (1997). Cognitive expectations in high school students' mathematics-related interest and performance. *Journal of Counseling Psychology*, 44(1), 44-52.
- National Center for Educational Statistics (NCES). (2007). *The nation's report card*. Retrieved on October 10, 2007 from http://nationsreportcard.gov/math_2007/.
- National Council of Teachers of Mathematics. (1989). *Curriculum and Evaluation Standards for School Mathematics*. Reston, VA: Author.
- National Council of Teachers of Mathematics. (2000). *Principles and Standards for School Mathematics*. Reston, VA: Author.
- National Council of Teachers of Mathematics. (2006). *Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics: A Quest for Coherence*. Reston, VA: Author.
- Schmidt, W., Houang, R., & Cogan, L. (2002). A coherent curriculum: The case of mathematics. *American Educator*, 26(2), 1-18.

Todd Clark, todd.clark@fldoe.org, is the Deputy Director for the Office of Mathematics and Science at the Florida Department of Education.

Rob Schoen, Robert.schoen@fldoe.org, is the mathematics specialist for the Florida Department of Education Office of Math and Science. His favorite Bodies of Knowledge in the mathematics 2007 Sunshine State Standards are Financial Literacy and Discrete Mathematics. He encourages teachers to examine and use the concepts in these Bodies of Knowledge to improve student interest and learning in mathematics.



Dimensions in Mathematics

Dimensions in Mathematics is published by the Florida Council of Teachers of Mathematics (FCTM) twice yearly. Subscribers have permission to reproduce any classroom activities published in *Dimensions*.

Dimensions in Mathematics is devoted to the improvement of mathematics education at all instructional levels. Articles which appear in *Dimensions in Mathematics* present a variety of viewpoints which, unless otherwise noted, should not be interpreted as official positions of the Florida Council of Teachers of Mathematics.

For more information on FCTM, including membership information, visit the FCTM web site www.fctm.net.

Table of Contents

President's Message

Nancy Kinard, FCTM President3

Kenneth P. Kidd, Mathematics Educator of the Year

Carol Martin.....4

Florida's Answer to "A Mile Wide and an Inch Deep:" Mathematics Content Standards that Allow Time for In-Depth Teaching and Learning

Robert C. Schoen and J. Todd Clark.....6

Understanding the K-8 Mathematics Standards: What's New About the New K-8 Mathematics Standards?

Gladis Kersaint and Juli K. Dixon.....13

Securing a Congressional Majority: An Exercise in Ordering Data

Bonnie H. Litwiller and David R. Duncan.....17

Squirrels, Age, Baseball, and Cookies: A Look at Working Backwards

Debbie Cascone.....20

Walking Around the Farm: Taking the Abstract out of First Quadrant Graphing

Barba Patton, Carol Klages, and Deborah Hartman.....24

Lichtenberg Pre-Service Educator Grant27

Florida Council Membership Application.....29