



CCSSM:

Getting Started in K–Grade 2

By Jeanne White and Linda Dauksas

Second in the Common Core State Standards for Mathematics series, this article addresses aspects of the Standards unique to the grade band.

To support mathematics educators as they consider implications that the Common Core State Standards for Mathematics (CCSSM) have on instruction and assessment, *Teaching Children Mathematics* is publishing five feature articles. In this one, authors White and Dauksas suggest implementation strategies for K–grade 2. Future articles in the series will cover additional topics, ideas, and commentary addressing other grade bands.

Rather than feeling overwhelmed at the thought of integrating the new Common Core State Standards for Mathematics (CCSSI 2010) into their teaching practice, teachers might view this as an opportunity to deeply embed mathematics into the K–grade 2 curriculum in the same way that literacy has long been rooted into early learning environments. Implementing CCSSM requires more intentional teaching of math so students will work at higher levels of mathematical thinking beginning in kindergarten. Being intentional with instruction does not have to be at the sacrifice of the sense of wonder and playful discovery that are characteristic of K–grade 2 classrooms. As teachers begin to implement CCSSM in their classrooms, their teaching of math can increase in rigor, and expectations can be set even higher. Implementing best practices for children in K–grade 2, teachers intentionally balance children's need for focused instruction about a specific subject area or concept with children's need to build on what they already know; and they purposefully make connections between concepts and domains of learning. CCSSM reinforce this integrated approach to curriculum and can be accomplished in such ways as incorporating mathematics into other content and tapping into students' interests while connecting new learning to prior knowledge (Copple and Bredekamp 2009).

In this article, we first discuss characteristics of CCSSM at the K–grade 2 level. Second, we discuss why teachers may have to change their thinking about math instruction to create a culture of mathematics in the classroom. Last, we offer suggestions for generating a cycle of



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reflection for teachers so they can grow through their efforts to effectively implement CCSSM.

Understanding the differences

At first glance it may seem that the Domains in CCSSM are markedly different from the five Content Standards established in NCTM's *Principles and Standards for School Mathematics* (2000). On closer examination, evidence suggests integration with the NCTM Content Standards. CCSSM are structured differently than the NCTM Content Standards, comprising larger groups of related Standards called

Domains. Within Domains are groups of Standards known as *Clusters*. Four Domains are common to kindergarten, first grade, and second grade:

1. Operations and Algebraic Thinking
2. Number and Operations in Base Ten
3. Measurement and Data
4. Geometry

Measurement has been integrated with the NCTM Data and Probability Standard. The

Operations Domain is combined with Algebraic Thinking and treated as a stand-alone Domain with emphasis on place value. Kindergarten has the additional Counting and Cardinality Domain, in which the three clusters of Standards focus on counting to 100, counting on from any given number, and writing numerals and representing objects to 20. Place value is emphasized in K–grade 2 with specific Standards attributed to composing and decomposing numbers and connecting place value with the properties of addition and subtraction. The exploration of fractions is contained in the Geometry Domain in first and second grade. Learning about time and money appear explicitly in the Measurement and Data Domain in second grade. For teachers to make sense of the Standards, critical areas have been identified as a focus for each grade level. These critical areas uniformly precede each grade level overview in the CCSSM document and provide a deeper explanation of

student expectations for those critical areas.

At the kindergarten level are two crucial areas: (1) representing and comparing whole numbers, initially with sets of objects, and (2) describing shapes and space (CCSSI 2010, p. 9). First grade has four critical areas: (1) developing understanding of addition, subtraction, and strategies for addition and subtraction within 20; (2) developing understanding of whole number relationships and place value, including grouping in tens and ones; (3) developing understanding of linear measurement and measuring lengths as iterating length units; and (4) reasoning about attributes of, and composing and decomposing, geometric shapes (CCSSI 2010, p. 13). Second grade also has four critical areas: (1) extending understanding of base-ten notation; (2) building fluency with addition and subtraction; (3) using standard units of measure; and (4) describing and analyzing shapes (CCSSI 2010, p. 17).

These essential areas will be the core focus of your mathematics curriculum and, we suggest, beyond. You are most likely giving attention to these areas already. Now you can further engage your students in these areas through the eight Standards for Mathematical Practice, which align with the NCTM Process Standards of Problem Solving, Reasoning and Proof, Communication, Connections, and Representation and with the National Research Council's report *Adding It Up* (2001). Think of the Standards for Mathematical Practice as a way for students to focus on the process, rather than simply the product, when they engage in mathematics.

Introduce the Standards with student-friendly language, post them in the classroom, give them to students for use at school and home, and discuss them with the students' families (see table 1). As students at the K–grade 2 level become familiar with the Standards for Mathematical Practice and use the ideals regularly, they will be more apt to use them in third grade and beyond. Teachers of all grades should become familiar with the language of CCSSM and use the terms *domains*, *clusters*, and *standards* with their students. Teachers and students should use the glossary and the tables at the end of the CCSSM document. A link to the document can be made available to all families, along with corresponding schoolwork, further expanding the audience for CCSSM. Providing families

TABLE 1

To facilitate the daily use of Standards for Mathematical Practice and a problem-solving perspective, K–grade 2 teachers can use student-friendly language and terms with which students should already be familiar.

CCSS for Mathematical Practice	Student-friendly language
Make sense and persevere in solving problems.	I can try many times to understand and solve a math problem.
Reason abstractly and quantitatively.	I can think about the math problem in my head, first.
Construct viable arguments and critique the reasoning of others.	I can make a plan, called a <i>strategy</i> , to solve the problem and discuss other students' strategies too.
Model with mathematics.	I can use math symbols and numbers to solve the problem.
Use appropriate tools strategically.	I can use math tools, pictures, drawings, and objects to solve the problem.
Attend to precision.	I can check to see if my strategy and calculations are correct.
Look for and make use of structure.	I can use what I already know about math to solve the problem.
Look for and express regularity in repeated reasoning.	I can use a strategy that I used to solve another math problem.



with information about how they can discover numeracy in their daily routines, can practice math vocabulary, and can problem solve means that families can reinforce CCSSM beyond homework assignments.

Creating a classroom culture

No matter which mathematics curriculum series your district adopts, the key areas at your grade level will become highlights of instruction; yet effort should be made to incorporate all the Standards at your grade level into your school routines. To truly put CCSSM into action the way it has been intended, teachers may have to alter their instruction and environment while thinking differently about how children learn mathematics skills and concepts. Most teachers will not experience a big change in what they teach but in how they teach it. The focus will be on the process, not just the product, and a culture of mathematics will prevail in classrooms. Children will be expected to engage in higher-level thinking and will be allowed opportunities to make connections and discoveries, work together, ask questions, and pose problems—revealing their prior knowledge.

To focus on the process of mathematical thinking and reasoning, teachers can help students unpack their thinking about computation. When learning addition and subtraction facts, children should have opportunities to explore the relationship among the various facts and discover the commutative property. Working in small groups and sharing discoveries about how to relate subtraction facts to addition facts will naturally lead students into the concept of fact families. However, instead of merely filling in the blanks on an activity sheet, children will be able to explain why fact families exist. The eight Standards for Mathematical Practice provide a framework for allowing children to approach a word problem with various strategies. Even if children do not arrive at the correct answer, the incorrect answers and various methods for attempting to solve the problem supply rich opportunities for discussion. Such discourse can lead to the understanding and development of alternate or more efficient solution strategies.

What approach might a teacher take to create a culture of mathematics learning and doing in a classroom? When children walk into a classroom, it should be apparent that math is

Online Resources

- <http://illuminations.nctm.org/> offers Standards-based activities and lessons for all grade levels.
- <http://www.insidemathematics.org/> offers video clips, classroom examples, and tools for math instruction based on CCSSM.
- <http://www.aplusmath.com/> is a site where students can play interactive math games and teachers can produce resources for additional practice.

as important as reading. A true culture of mathematics would have word walls adorned with mathematical terms, in addition to sight words and spelling words. The classroom library would have math-concept literature books and manipulatives alongside toys and games to challenge growth and learning. Children would be invited to pose and post mathematical questions, which would be displayed on a bulletin board or chart paper. Math songs, such as those produced by Ron Brown for Intelli-Tunes, may be playing in the background.

Children should also be encouraged to discover and use mathematics across content areas. For example, in social science classes, students can use the skill of measurement when they read and draw a map. During art class, students can reinforce their knowledge of shapes and designs, emphasizing names and properties as they create collages, tessellations, and symmetrical designs. Young children will be better able to use and recall mathematical skills and terminology when they have had opportunities to apply them in more than one context.

CCSSM challenges young children to continuously engage in higher-level thinking and reasoning. Regarding measurement and data, children in kindergarten will be expected to describe attributes of an object such as length, height, or weight rather than merely identify them. In geometry, kindergartners will analyze and compare shapes using informal language; in first and second grade, children will use formal terms to reason with shapes and their attributes. This demand for more rigorous thinking can be met if children are engaged in mathematical situations that allow them to compare, analyze, examine, compose, design, develop, assess, justify, and predict throughout the school year. Teachers and students should become familiar

with the verbs in Bloom's Taxonomy (Bloom 1956) and strive to engage in activities that reach all six levels consistently.

Young children have an innate curiosity about the world around them, which includes recognizing shapes in their environment, counting people, and finding similarities and differences among objects. In the same way that Mrs. Fibonacci put a math curse on her students in the precocious picture book *The Math Curse* (Scieszka 1995), teachers are charged with putting a math curse on students so they can begin to see math problems in every part of their daily routines. They will learn more quickly with the constant reinforcement of mathematical terminology, skills, and concepts coupled with a playful attitude toward math.

Generating growth

We hope teachers are eagerly anticipating the implementation of CCSSM in their classrooms. For the process to be successful for teachers and students alike, care should be taken to conscientiously make changes while reflecting on both formative and summative assessments throughout the year. To assist in this process, we include the following as a suggested step-by-step approach:

- **Familiarize** yourself with the domains, clusters, standards, and critical areas for your grade level. Focus first on the concepts you are already covering and those most familiar to you and your students. Plan how you can begin to incorporate the student-friendly version of the Standards for Mathematical Practice (see **table 1**) into your classroom when teaching these familiar concepts.
- **Reflect** on how you currently develop computational fluency and foster understanding of mathematics concepts in your classroom. Plan how you can incorporate additional opportunities for students to practice their computational skills and deepen their understanding of other math concepts.
- **Identify** existing resources that can aid in improving the computational fluency of your students. Start with curricula resources for your grade level in your media center, in your classroom, and those that can be borrowed from a colleague. Look for free resources available online (see **sidebar**, p. 443).

- **Make** a list of students who are not ready for the skills required at the current grade level, identify their weak areas, and plan how to incorporate more practice at home, with a partner, during a pullout program, and during small-group math instruction.
- **Keep** track of mathematical concepts that seem more difficult to incorporate into your existing math schedule, concepts with which you are unfamiliar, and any resources you are lacking.
- **Have** conversations with other teachers who teach the same grade level, as well as a grade level below and above yours. Share ideas, resources, and strategies. Speak with your principal about resources and areas for support that could take place in the form of professional development.
- **At** the end of the school year, reflect on effective instructional methods; note those you should continue to use in next year's math program. Make a plan for incorporating any skills or concepts that were given minimal attention as well as areas that were difficult for children to grasp. Seek out additional resources, materials, games, strategies, and other ways to continuously improve the mathematics culture in your classroom.

Concluding thoughts

Teachers must orchestrate classroom events and environments to both envelope and engage students in high-level mathematics. Classrooms adorned with examples of symbolic and abstract math representations coupled with the appropriate vocabulary terms invite mathematical activity. Create mathematical environments beyond the classroom: in the gym, on the playground, and in the lunchroom. Every teacher is responsible for taking advantage of opportunities for students to practice mathematical concepts and use mathematical vocabulary in discourse throughout the school day. Consider specifically planning these types of interactions with other teachers in your school, much like the plans many schools have to write across the content areas for literacy initiatives.

Most important, teachers must challenge and support all young children as they engage in the CCSSM, maintaining expectations that each one, no matter their ability, can grow mathematically and view their world numerically. Districts

should partner with their states and the nation to support all teachers as they assume responsibilities to deepen their own understanding of the K–grade 2 mathematical concepts and how to best teach these concepts to young children.

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