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State-Level Actions Following Adoption of Common Core State Standards for Mathematics

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The adoption of *Common Core State Standards for Mathematics* (CCSS-M) by 45 states,[1] the District of Columbia, the Northern Mariana Islands, and the U.S. Virgin Islands represents a historic landmark in curriculum governance in the United States. For the first time, a significant majority of K-12 teachers and students will focus on common learning expectations for mathematics. Coupled with common grade-level assessments aligned to CCSS-M currently under development by two state-led consortia—Partnership for Assessment of Readiness for Colleges and Careers (PARCC) and the Smarter Balance Assessment Consortium (SBAC)—this initiative has the potential to impact aspects of educational practice critical to K-12 students' mathematical learning (e.g., teacher preparation and professional development, curriculum material development, and policies related to K-12 course-taking and graduation requirements).

Adopting common mathematics standards was a significant undertaking and many are surprised at the widespread, rapid, and non-partisan acceptance of CCSS-M, particularly given the historic record of local (or state) governance with regard to educational decisions (Goertz, 2008; Long, 2003). The widespread acceptance of CCSS-M is due, at least in part, to the fact that the development of common standards was a state-driven initiative led by the Council of Chief State School Officers (CCSSO) and the National Governors Association (NGA).

Following the adoption of CCSS-M, state education systems have engaged in several initiatives, including:

- Giving a state identity to CCSS-M, in some cases augmenting CCSS-M according to local needs;
- Collaborating with one or both of the state-led assessment consortia to design and utilize common assessments for grades 3-8 and high school; and
- Developing and implementing a timeline and plan for transitioning from current state standards to CCSS-M.

This article provides a summary of state actions taken in the first year following adoption of CCSS-M in these three areas.

Giving CCSS-M a State Identity

Although states were expected to adopt CCSS-M in its entirety, thus, resulting in "common" standards across the U.S., they were granted latitude in order to honor local needs. As noted in information shared with states, "while states will not be considered to have adopted the common core if any individual standard is left out, states are allowed to augment the standards with an additional 15% of content that a state feels is imperative" (Achieve, 2010).

To date, 35 of the 45 states that adopted CCSS-M have done so without "augmenting" the standards. That is, they

[1] The CCSS was adopted by all states except Alaska, Minnesota, Nebraska, Texas, and Virginia.

adopted CCSS-M without adding additional standards or modifying the language of the standards. In these cases, the state departments of education websites either link directly to the standards located on the official CCSS-M website (http://www.corestandards.org/) or the states developed a new cover page/front material for the document with state identification (e.g., *Indiana Common Core State Standards* available at: https://learningconnection.doe.in.gov/Standards/About.aspx?art=11.

Ten states augmented CCSS-M prior to or immediately following its adoption. Eight of these states augmented CCSS-M by: (1) adding additional standards (Alabama, Arizona, California, Colorado, Iowa, Massachusetts, and

Table 1 — North Dakota Mathematics Content Standards

Kindergarten

Domain: Counting and Cardinality		**K.CC**
Cluster: Know number names and the count sequence.		
Code	**Standards**	**Annotation**
K.CC.1	Count to 100 by ones and by tens.	Pennies and dimes may be used to model ones and tens.
K.CC.2	Count forward beginning from a given number within the known sequence (instead of having to begin at 1).	Number range for this skill should be up to 100. Example: Student is given a number within the range of 0 to 100. For example, use 56. Student must count forward in sequence from that number. "56, 57, 58, 59" on so on.
K.CC.3	Write numbers from 0 to 20. Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects).	
Cluster: Count to tell the number of objects.		
Code	**Standards**	**Annotation**
K.CC.4	Understand the relationship between numbers and quantities; connect counting to cardinality.	Number range for this skill should be up to 20.
	a. When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object.	
	b. Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted.	
	c. Understand that each successive number name refers to a quantity that is one larger.	
K.CC.5	Count to answer "how many?" questions about as many as 20 things arranged in a line, a rectangular array, or a circle, or as many as 10 things in a scattered configuration; given a number from 1–20, count out that many objects.	This standard includes the following skills: a. Use up to 20 objects arranged in a line, rectangular array and a circle. b. Use up to 10 objects in a scattered configuration. c. When given a number from 1-20, count out that many objects.

Source: (*North Dakota Mathematics Content Standards*, http://www.dpi.state.nd.us/standard/content/math/2011/math.pdf, p. 12)

New York) or encouraging districts to give more emphasis to specific topics (Kansas); (2) moving standards from one grade to another (California), or (3) modifying standards by adding or changing words (Alabama, California, Colorado). The other two states (Maryland and North Dakota) modified the format or annotated CCSS-M. In particular, North Dakota added an "annotations" column with examples, definitions, and comments in the state's CCSS-M document but did not change the individual statements of the standards within CCSS-M. The annotations are intended to help district administrators and teachers understand the standards and provide guidance in interpreting them. (See Table 1 for sample annotations from the *North Dakota Mathematics Content Standards,* Grade K.)

In the Maryland version of CCSS-M (Maryland Department of Education, 2011), statements of "Essential Skills and Knowledge" follow many of the common core standards. These statements are intended to:

> provide language to help teachers develop common understandings and valuable insights into what a student must know and be able to do to demonstrate proficiency with each standard. Maryland mathematics educators thoroughly reviewed the standards and, as needed, provided statements to help teachers comprehend the full intent of each standard. The wording of some standards is so clear, however, that only partial support or no additional support seems necessary. (p. 5)

For example, at Grade 3, following the standard (3.NF.1), *Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b*, Maryland (2011) includes the following additional statements:

- Knowledge of the relationship between the number of equal shares and the size of the share;
- Knowledge of equal shares of circles and rectangles divided into or partitioned into halves, thirds, and fourths;
- Knowledge that, for example, the fraction 1⁄4 is formed by 1 part of a whole which is divided into 4 equal parts. Knowledge that, for example, the fraction 3⁄4 is the same as 1⁄4 + 1⁄4 + 1⁄4 (3 parts of the whole when divided into fourths);
- Knowledge of the terms numerator (the number of parts being counted) and denominator (the total number of equal parts in the whole);
- Knowledge of and ability to explain and write fractions that represent one whole (e.g., 4/4, 3/3);
- Ability to identify and create fractions of a region and of a set, including the use of concrete materials; and
- Knowledge of the size or quantity of the original whole when working with fractional parts. (p. 18)

Table 2 includes a summary of the extent and nature of state augmentation of CCSS-M by eight states and includes examples of standards that were added, deleted, moved to a different grade level, or whose language was changed. As noted, in the Kansas version of CCSS-M teachers are encouraged to give additional attention to two themes: probability and statistics and algebraic patterning:

> In recognition of the long history in Kansas of the ability for local school districts to make decisions for themselves, the review committee felt strongly that these topics should be set aside from the detail of the main document with enough information provided for each school and/or district to decide how to incorporate [these topics]. (p. 9)

Common themes in the K-8 standards added (augmented) include:

- Emphasis on money or time in the primary grades (CA, IA, MA)
- Emphasis on computational estimation, judging reasonableness of computations, or approximate error in measurement (CA, MA)
- Increased attention to patterning (CA, KS)

Although five states (Alaska, Minnesota, Nebraska, Texas, and Virginia) have, to date, chosen not to adopt CCSS-M, the common core initiative is having an impact in at least some of these states. For example, the Virginia Department of Education (2011) website indicates that the state is:

> using the commonwealth's established process for adopting and revising academic standards to incorporate content from the *Common Core State Standards* into the Standards of Learning (SOL). In doing so, the board

Table 2. Examples of augmentation of CCSS-M

State	Extent and Nature of Augmentation	Examples of Augmentation
AL	65 changes (Gr. 9-12, including new standards and additional words added to CCSS-M standards)	• *Analyze determinants and inverses of 2 × 2, 3 × 3, and larger matrices to determine the nature of the solution set of the corresponding system of equations, including solving systems of equations in three variables by echelon row reduction and matrix inverse. (Gr. 9-12, new)* • *Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v, |v|, ||v||),* ***including the use of eigen-values and eigen-vectors****. (Gr. 9-12, phrase in bold added)*
AZ	8 standards added (three at Gr. 4; one at Gr. 6; four at Gr. 9-12)	• *Solve a variety of problems based on the multiplication principle of counting. (Gr. 4, new)* • *Convert between expressions for positive rational numbers, including fractions, decimals, and percents. (Gr. 6, new)* • *Study the following topics related to vertex-edge graphs: Euler circuits, Hamilton circuits, the Traveling Salesperson Problem (TSP), minimum weight spanning trees, shortest paths, vertex coloring, and adjacency matrices. (Gr. 9-12 ,new)*
CA	64 changes (Gr. K-12, including new standards, additional words added to CCSS-M standards and movement of standards from one grade to another)	• *Identify the time (to the nearest hour) of everyday events (e.g., lunch time is 12 o'clock, bedtime is 8 o'clock at night). (Gr. K, new)* • *Tell and write time from analog and digital clocks to the nearest five minutes, using a.m.* ***and p.m. Know relationships of time (e.g., minutes in an hour, days in a month, weeks in a year).*** *(Gr. 2, phrase in bold added)* • *Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. (Gr. 7 in CCSS-M; Gr. 6 and 7 in CA version of CCSS-M)*
CO	Many word changes, addition of personal financial literacy standards (Gr. K-12)	• *Identify two fractions as equivalent (equal) if they are the same size, or the same point on a number line. (Gr. 3, "Understand" changed to "Identify")* • *Know there is a Define the complex number i such that $i^2 = -1$, and show that every complex number has the form a + bi where a and b are real numbers. (Gr. 9-12, changed "Know there" is a to "Define the")*
IA	Thirteen standards added (two standards added at Gr. 2, eleven added at Gr. 9-12)	• *Use interviews, surveys, and observations to collect data that answer questions about students' interests and/or their environment. (Gr. 2)* • *Understand, analyze, apply, and evaluate some common voting and analysis methods in addition to majority and plurality, such as runoff, approval, the so-called instant-runoff voting (IRV) method, the Borda method and the Condorcet method.(Gr. 9-12)*
KS	Encourage additional emphasis on Probability/Statistics & Algebraic Patterning	
MA	*25 standards added (two at Gr. 1, two at Gr. 2, one at Gr. 4, one at Gr. 5, five at Gr. 6, two at Gr. 7, twelve at Gr. 9-12)*	• *By the end of Grade 2, know from memory related subtraction facts of sums of two one-digit numbers. (Gr. 2)* • *Solve problems that relate the mass of an object to its volume. (Gr. 6)* • *Use equations and graphs of conic sections to model real-world problems. (Gr. 9-12)*
NY	2 standards added (one at Gr. K and one at Gr. 1)	• *Develop understanding of ordinal numbers (first through tenth) to describe the relative position and magnitude of whole numbers (K)* • *Recognize and identify coins, their names, and their value. (Gr. 1)*

Table 3. States participating in PARCC and SBAC

PARCC		SBAC	
Alabama	Massachusetts (G)	Alabama	Nevada (G)
Arizona (G)	Mississippi (G)	California (G)	New Hampshire (G)
Arkansas (G)	New Jersey (G)	Connecticut (G)	North Carolina(G)
Colorado (G)	New Mexico (G)	Delaware (G)	North Dakota
District of Columbia (G)	New York (G)	Hawaii (G)	Oregon (G)
Florida (G)	North Dakota	Idaho (G)	Pennsylvania
Georgia (G)	Ohio (G)	Iowa (G)	South Carolina
Illinois (G)	Oklahoma (G)	Kansas (G)	South Dakota (G)
Indiana (G)	Pennsylvania	Maine (G)	Vermont (G)
Kentucky	Rhode Island (G)	Michigan (G)	Washington (G)
Louisiana (G)	Tennessee (G)	Missouri (G)	West Virginia (G)
Maryland (G)		Montana (G)	Wisconsin (G)
			Wyoming

"G" indicates role as governing partner.

> and [Virginia Department of Education] are ensuring that expectations for teaching and learning in Virginia schools are comparable to, or in some instances exceed, those of the voluntary national standards. (paragraph 1)

Likewise, in the 2011 draft revision of the Texas Essential Knowledge and Skills (TEKS), writers drew heavily from CCSS-M, in some cases using identical language. (See *The Commissioner's Draft of the Texas Mathematics Standards,* http://www.tea.state.tx.us/index2.aspx?id=2147499971).

In summary, while most states adopted CCSS-M without modification, a few states have chosen to augment or include clarifying examples or annotations. The extent of augmentation ranges from adding one or two standards at a particular grade level (e.g., Iowa) to movement of standards across grade levels and changes in wording (e.g., California). On the other hand, most states adopted CCSS-M as published, thereby adhering to the goal of "common" standards across states. However, in many states additional documents or materials were developed to support teachers as they transition to CCSS-M.

Collaborating on Assessments Aligned with the CCSS-M

Since the adoption of CCSS-M, states have joined and contributed to one or both of two state-led assessment consortia funded by the U.S. Department of Education—PARCC and SBAC. (See Table 3.) States contribute as a "governing" partner to a single consortium, or as a "participating" partner, where they monitor the work of both consortia but delay a decision regarding use of a particular consortia assessment. Both consortia are committed to developing technology-based adaptive mathematics assessments for students in grades 3-8 and high school. These assessments will report students' progress toward and attainment of the knowledge and skills required for college and career readiness as defined by CCSS-M.

Information about the nature and extent of involvement in the assessment consortia is not readily available on many state departments of education websites. However, consortia websites indicate state level involvement in various consortia committees or work groups (e.g., PARCC Committees such as K-12 Leadership Team, Higher Education Leadership Team, and Technical Advisory Committee and SBAC Work Groups such as Accessibility and Accommodation, Item Development, and Test Administration). Perhaps the most notable contribution of states to the assessment consortia is the development of consortia assessment frameworks that are guiding the construction of assessments. These frameworks are available for public review (see http://www.parcconline.org/parcc-model-content-frameworks and http://www.smarterbalanced.org/smarter-balanced-assessments/) and will be used by providers who respond to a call to create elements of the consortia assessments via competitive bids.

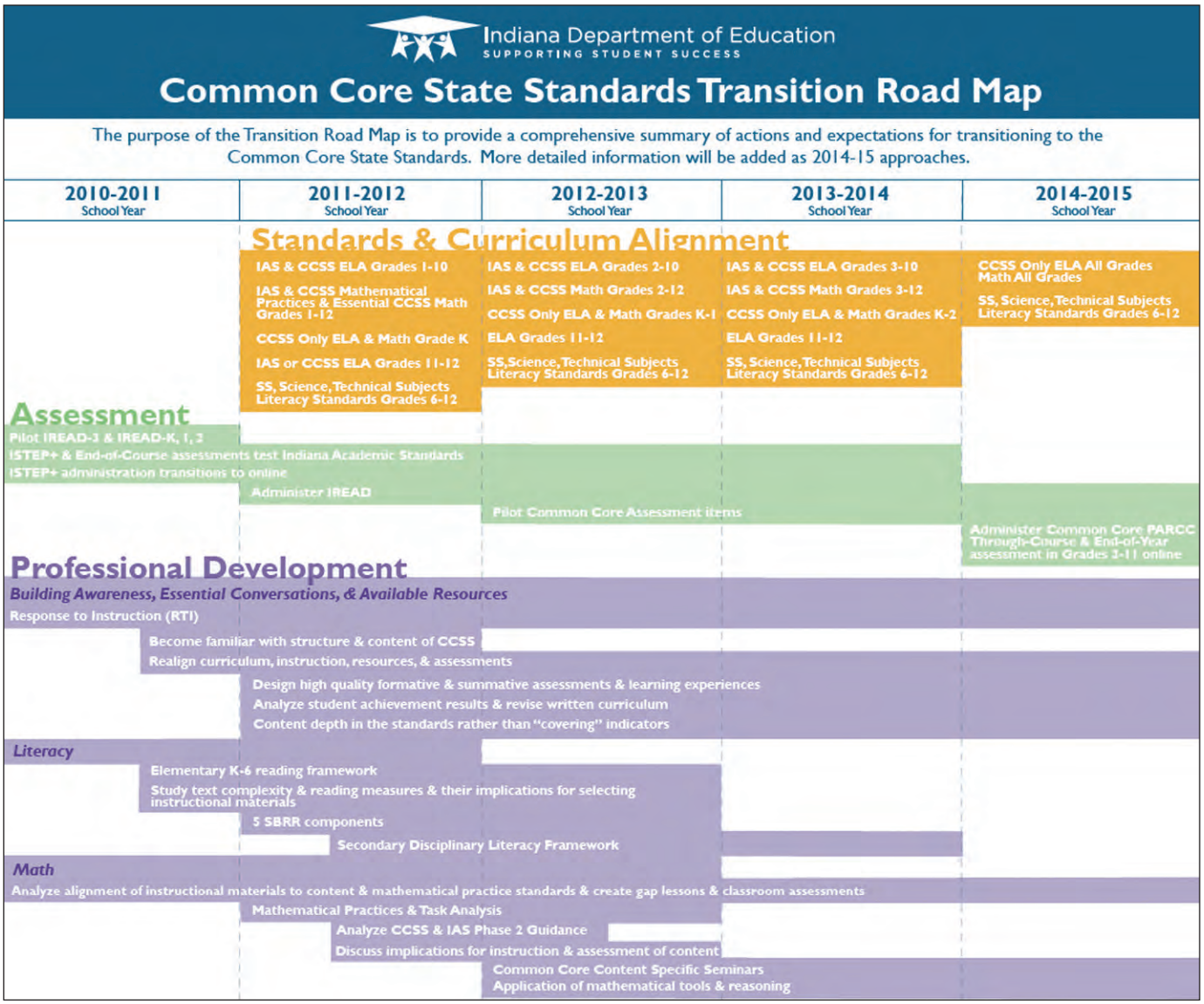
The common, CCSS-M-aligned assessments are expected to be ready for full implementation in 2014-15. In the meantime, states are utilizing either their existing state assessment system or a modified version of their state assessment system that represents some attention to CCSS-M. In either case, many state departments of education have

developed implementation timelines, presenting plans and deadlines for transitioning from the current state standards and assessments to CCSS-M. Based on a review of the state timelines for implementation of CCSS-M, we summarize here some features of the transition plans.

Transitioning to CCSS-M

Most states began their transition to CCSS-M by developing a "crosswalk document" that compared the current state standards to CCSS-M. The document provides a means for teachers to understand changes in student learning expectations and, thus, in instructional emphasis. In addition, some states developed "bridging documents" including timelines for transitioning from current standards to CCSS-M as well as recommendations for graduated implementation of CCSS-M (e.g., partial implementation of CCSS-M in some grades or moving some standards from one grade to another in preparation for the full transition). The transition timelines include specification of when teachers are expected to use CCSS-M, rather than current state standards, in determining the focus of their instruction. In some cases, the bridging plan also includes staged plans for professional development of teachers, and identification of the year in which state assessments will align with CCSS-M (e.g., Indiana's initial timeline is shown in Figure 1).

FIGURE 1: INITIAL *Indiana timeline for CCSS-M implementation*



Source: Retrieved November 14, 2011, from http://www.doe.in.gov/sites/default/files/curriculum/transition-road-map-implementing-common-core-state-standards1_0.pdf

The timelines for how and when states are transitioning to CCSS-M vary considerably. For example, Florida's timeline (see http://www.fldoe.org/arra/pdf/CCSSRolloutTimeline.pdf) includes a phased-in implementation of CCSS-M as follows:

- Gr. K in 2011-12;
- Gr. K-1 in 2012-13;
- Gr. K-2 in 2013-14;
- Full K-12 implementation in 2014-15.

In contrast, in Kentucky, "Teachers will begin to provide instruction related to the standards in the fall of 2011. Students will be assessed on the Common Core Standards beginning in the spring of 2012" (Kentucky Board of Education, Press Release, Feb. 10, 2010).

In addition to Kentucky, a few states began implementation of CCSS-M during 2011-12. For example, Arizona and Florida implemented CCSS-M in grade K; Arkansas, Nevada, New Hampshire, New Jersey, and Oregon in grades K-2; Mississippi in grades K-8; and Utah in grades 6 and 9. These states will continue to transition to CCSS-M in other grades in subsequent years.

Some state departments of education initially encouraged teachers to focus on implementing the *Standards for Mathematical Practice of CCSS-M*. For example, as shown in Figure 1, Indiana teachers were directed to focus on the standards for mathematical practice in the first phase of implementation (2011-12) in addition to implementing the mathematical content standards in Kindergarten. In other states, decision-making regarding implementation of CCSS-M is focused at the school district level, rather than the state level. For example, state officials in Tennessee encourage districts to choose when they will implement CCSS-M within the period 2011-14. In some cases, implementation of CCSS-M is dictated by state legislation or policy. For example, California will suspend the normal state-facilitated curriculum review cycle, delaying the development of a curriculum framework until July 2015.

As early as 2010-11, some states had already initiated professional development related to CCSS-M. For example, Kansas sponsored a series of one-week regional academies during the summer of 2011 focused on assisting teachers and administrators with preparation for the transition to CCSS-M. Other states (e.g., Louisiana) offered webinars for teachers and administrators.

A few state departments of education (e.g., Missouri, South Dakota, Utah) are sponsoring or partnering with others on the development of curriculum materials aligned to CCSS-M. In some cases, this work is intended to provide support for teachers until new CCSS-M-aligned textbooks are available and can be reviewed and purchased. In other cases, it responds to the need for particular kinds of materials. For example, the Utah Department of Education is partnering with *The Mathematics Vision Project* (http://www.mathematicsvisionproject.org/) on the development of high school materials aligned with the Common Core State Standards as organized within the *Integrated Mathematics 1* pathway (Appendix to CCSS-M).

Summary

The release of CCSS-M and its subsequent adoption has set in motion a massive effort across the nation to understand the new standards, assimilate CCSS-M into existing state structures, plan for implementation and, in some cases, begin implementation in classrooms. As summarized in this article, states are institutionalizing CCSS-M in various ways and are approaching implementation through state-led or localized district-led activities.

Based on a review of state department of education websites and communication with state department staff, we have summarized here activity at the state level in response to CCSS-M. However, it is not clear which components or how much of this effort and activity is penetrating to the district and school or teacher level. Additional research (e.g., district case studies) is needed in order to understand how this major policy initiative is playing out at all levels of the educational system.

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