Analysis of the Commonwealth of Massachusetts State Standards and the Common Core State Standards for English Language Arts and Mathematics

Final Report

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Prepared for the Massachusetts Business Alliance for Education (MBAE) by

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Executive Summary

WestEd was commissioned by the Massachusetts Business Alliance for Education (MBAE) to conduct an independent analysis of the revised Commonwealth of Massachusetts state standards and the Common Core State Standards (CCS) to address the following key question:

To what extent do the revised Commonwealth of Massachusetts state standards correspond with the CCS in English language arts (ELA) and mathematics?

Methodology

In order to address this question, WestEd analysts who have knowledge and experience in standards evaluation and development, test development, and alignment, as well as deep knowledge of the content areas (English language arts and mathematics), curriculum and instruction, the preK–20 student population, and effective educational practices, were trained to conduct an analysis of the following standards documents:

Revised Commonwealth of Massachusetts State Standards (MA)

- English Language Arts Curriculum Frameworks Working Draft (June 2010)
    - Individual grades PreK through 12 for all strands except:
        - 4 (Vocabulary) with grade span 9─12; 6 (Foundations) with grade span 7─12; 12 (Research) with grade spans 5─8 and 9─12
- Mathematics Curriculum Frameworks Working Draft (June 2010)
    - Individual grades PreK through 12, grade spans 9─10 and 11─12, and four courses

Common Core State Standards (CCS)

- English Language Arts, including the Literacy standards
    - Individual grades K through 8; grade spans 9─10 and 11─12
- Mathematics
    - Individual grades K through 8, and six high school conceptual categories

More specifically, WestEd analysts created a *crosswalk* between the two sets of standards. Crosswalks are useful tools for describing the alignment, or degree of correspondence, between two sets of content standards. WestEd analysts used the following criteria to conduct this crosswalk analysis:

- Content skill and knowledge alignment─Degree of correspondence was judged by analysts according to the following:
    - Full Alignment: The CCS standard describes a fundamental skill or concept as explicitly stated in the MA standard (or vice versa);
    - Partial Alignment: The CCS standard addresses a MA standard in a superficial way (or vice versa); the CCS standard covers targeted skills at a lower or higher complexity level than the MA standard.; and
    - No Alignment: There is no content relationship between the two standards.
- Depth of knowledge─ There are four levels of cognitive complexity (Webb, 1997):
    - Recall: The standard requires students to recall a fact, procedure, or piece of information;
    - Basic Application: The standard requires students to use a skill or concept;
    - Strategic Thinking: The standard requires students to reason, develop a plan, or follow a sequence of steps; and

- Extended Thinking: The standard requires students to conduct an investigation or process multiple conditions/elements of a problem or task.

- Clarity
- Measurability

The resulting crosswalks reflect the following information:

- Identification of CCS that align to each of the state content standards, by grade and content area;
- Specification of the degree or level of the alignment (Full, Partial, or None) of each of the CCS to the state content standards, by grade and content area, including specific information about the substantive correspondence between the two sets of standards;
- Identification of the state content standards for which there are no matching CCS, by grade and content area;
- Information about the depth of knowledge (Recall, Basic Application, Strategic Thinking, or Extended Thinking) of each standard (both state and CCS), by grade and content area;
- Judgments of clarity of each standard, by grade and content area; and
- Judgments of measurability of each standard, by grade and content area.

The vertical alignment of the standards also was analyzed. That is, analysts evaluated the degree to which the skills and knowledge reflected in the standards appropriately relate to each other and increase in complexity across grade levels, such that, for example, prerequisite skills and knowledge appear, as appropriate, at lower grade levels; broader, deeper, and new skills and knowledge appear at higher levels (building on skills and knowledge in lower/prior levels) and are introduced at the appropriate level; any repetition of standards (i.e., skills and knowledge)

appears purposeful; and it is clear what skill/knowledge is to be acquired and when it is to be acquired.

Findings

Results of the analyses of the **mathematics** standards suggest the following:

- Based on both the 96% full or partial alignment between the two sets of standards, with at least one partial alignment between each of the state content standards and the CCS, and a qualitative analysis of the two sets of standards, the basic concepts and topics that typically define the mathematics domain are covered by both sets of standards, and that the standards are comparable in terms of content coverage.
- Most of the alignments between the MA standards and the CCS are partial alignments, and the partial alignments are either on-grade or off-grade alignments[1] of MA standards to CCS in grades above as well as grades below. Additionally, 13 of the 351 MA standards were not aligned with a CCS. Results of qualitative analyses of the MA standards with partial or no matches to the CCS suggest that these MA standards tend to define content in a narrow way. The particular skills and knowledge specified in these MA standards may well be incorporated in the resulting curriculum based on the corresponding grade-level CCS, although not explicitly specified in the CCS. That is, given the degree of general correspondence between the two sets of standards and the variations in level of specificity of the standards, the MA standards and CCS generally allow for a comparable breadth and depth of content.

[1] It is important to examine the nature of the off-grade alignments. Sometimes critical content and skills are purposefully repeated in lower and higher grade levels. Evaluation of the appropriateness of on- and off-grade alignments should be made vis-à-vis the desired goals of the state.

- The state content standards and the CCS are comparable with regard to clarity and measurability.
- With regard to depth of knowledge (DOK), the two sets of standards reflect a comparable range of cognitive demand. Both sets of standards contained content skills and knowledge at three of the four levels of Webb's (1997) cognitive demand taxonomy: Recall, Basic Application, and Strategic Thinking. The CCS, however, appear to more consistently cover these three DOK levels at each grade level. Neither set of standards reflects skills and knowledge at the Extended Thinking level.

  Differences between the two sets of standards include the following:

  Level of detail with which student experiences and learning expectations are described in the standards—for example, some CCS are stated more specifically or narrowly and may limit potential for full alignment with MA standards that are stated more generally or broadly. Consider these two standards:

  - MA.6.N.6. Extend the number theory concepts of prime and composite numbers to an understanding of prime factorization, relatively prime, greatest common factor, least common multiple, and multiples. Use divisibility rules to solve problems.
  - CCS.6.NS.4. Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. For example, express 36 + 8 as 4 (9 + 2).

An impact this may have on alignment results is that, in some cases, several partial alignments between a MA standards and CCS "add up to" a full alignment in terms of coverage of skills and knowledge reflected in the MA standard.

Organization of the standards—That is, MA standards have a more traditional organization with five strands (Number Sense and Operations; Algebra, Relations, and Functions; Geometry; Measurement; and Data Analysis, Statistics, and Probability) consistent across all grades. The CCS are organized with domain approaches to introducing new concepts and topics. The CCS seem somewhat similar to the National Council of Teachers of Mathematics focal points, in that there are combinations/connections among strands and different emphases depending on the grade level.

Approaches to introducing new concepts—The CCS appear more specific and provide more guidance related to the methods/strategies associated with the content; whereas MA standards seem generally less prescriptive. For example:

- In grade 3, MA standards continue with fractions:

  MA.3.N.4. Identify, represent, and compare fractions between 0 and 1 with denominators through 12 as parts of a whole and as parts of a group.

  MA.3.N.5. Identify, represent, and compare mixed numbers with denominators 2, 3, or 4 as whole numbers and as fractions (e.g., 1 2/3, 3 1/2).

  MA.3.N.6. Locate whole numbers, fractions, and mixed numbers with denominators 2, 3, or 4 on the number line. Use other concrete models and pictorial representations to represent and compare fractions and mixed numbers.

- The CCS grade 3 standards specify a more formal introduction to fractions:

  CCS.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.

  CCS.3.NF.2. Understand a fraction as a number on the number line; represent fractions on a number line diagram.

  a. Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line.

  b. Represent a fraction a/b on a number line diagram by marking off a lengths 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.

  Some of the differences of this type could be interpreted as indicators of differences in rigor; however, there is no consistent trend in the elements of each set of standards that supports one being clearly more rigorous than the other. The state and its stakeholders must examine the outcomes of this study vis-à-vis the state's history, values, and aspirations for its students, in order to determine the degree to which differences are significantly divergent in merit or whether they can be coordinated for augmentation.

- Overall, both sets of standards showed adequate vertical alignment.

Results of the analyses of the **English language arts** standards suggest the following:

- Based on both the 74% full or partial alignment, with at least one partial alignment when comparing the CCS to the MA standards, and a qualitative analysis of the standards, both sets of standards cover the same general concepts, knowledge, and skills that define the core domain of English language arts. There are a total of 535 MA standards and 860 CCS for ELA, and where they tend to differ is in elements of particular emphasis or focus of the content coverage. It is important to note that there may be potential for greater alignment if a reverse crosswalk were also conducted, comparing MA standards to the CCS.
- The state content standards and the CCS are comparable with regard to clarity and measurability.
- With regard to depth of knowledge (DOK), both sets of standards show Recall and Basic Application decreasing in percent as the grade levels increase, and Strategic Thinking and Extended Thinking increasing in percent as the grade levels increase. Compared to the MA standards, the CCS tend to have a lower percentage of standards at the Recall level, and a higher percentage of standards at the Strategic Thinking level. The CCS also have standards at the Extended Thinking level distributed across grades, whereas the MA standards at that DOK level are concentrated at grades 9 through 12.
- The different organization of content reflects a difference in focus between the two sets of standards and contributes to the nonalignment between them: as an example, the MA standards include strands on five genres of literature, whereas the CCS subdivide the literature standards into skill- and concept-related strands, intended to

apply to all genres of literature. The CCS also includes standards for literacy activities in other curriculum areas such as science, technology, and history.

- Overall, both sets of standards showed adequate vertical alignment for all the areas of ELA addressed in each set.

Conclusions and Recommendations

Based on these analyses, for both mathematics and ELA, the MA standards and the CCS overlap in content coverage and are comparable in terms of clarity and measurability. From a qualitative examination of the standards, both sets have merit. In ELA, for example, the MA standards include a focus on specific genres of literature and the clear, concise, and vertically well-aligned Research and Writing standards. The CCS include the detailed and vertically well-aligned Language standards, and the inclusion of the Standards for Literacy in History/Social Studies, Science and Technical Subjects. In mathematics, both sets of standards contain skills and knowledge across DOK levels; however, the CCS tends to include a slightly higher percentage of standards that reflect higher levels of cognitive demand (i.e. Strategic Thinking in mathematics; Strategic Thinking and Extended Thinking in ELA).

A closer examination of the nature of the correspondence between the two sets of standards is recommended, in order to verify that the particular points of overlap are in areas that are valued (e.g., particular content skills and knowledge, characteristics of standards), and to better understand the degree to which points of distinction present opportunities for further enhancing aspects of the state's standards rather than indicate limitations.