Mediocrity 2.0: Massachusetts Rebrands Common Core ELA & Math

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Introduction

When the U.S. Department of Education (USED) was handing out Race to the Top (RttT) grants in 2010, the goal was to standardize K–12 education across the country along utilitarian, workforce-development lines. But the Constitution and multiple federal laws forbid USED from forcing states into any particular education policy. USED thus used its power of the purse, via the Stimulus-funded RttT grants, to lure as many cash-hungry states as possible to adopt the Common Core national standards and aligned assessments, and to continue the ongoing build-out of identical student-data systems that could ultimately be linked as a further means of centralizing education.[1]

One of the most significant reforms from MERA was the creation of K–12 statewide curriculum frameworks.

USED found eager buyers among many states in a time of deep recession. But there were holdouts, skeptical of federal "persuasion" to buy a product (Common Core and the aligned tests) that was untested, unpiloted, and unproven. It was therefore important to entice the most influential states—the ones with the best reputations in education—to join the parade. And in education, there was no more influential state than Massachusetts.

How did Massachusetts become the crown jewel of U.S. K–12 education in the pre-Common Core era? Much credit goes to the education reform initiated by Democratic Senate and House co-chairmen of the legislature's education committees, Thomas Birmingham and Mark Roosevelt. The bipartisan Massachusetts Education Reform Act (MERA), which Republican Governor William Weld signed in 1993, instituted sweeping changes in Massachusetts education. In addition to establishing a baseline of funding for all districts, the law mandated a series of reforms including increased credentialing requirements for teachers, great management authority for school principals, and the creation of a new Massachusetts Comprehensive Assessment System (MCAS), which included tests that would be administered in grades 4, 8, and 10.

For purposes of this paper, one of the most significant reforms from MERA was the creation and implementation of K–12 statewide curriculum frameworks and learning standards in all core academic subjects. While only history and physical education had been statutorily required in K–12 schools statewide, the new law mandated that curriculum frameworks be developed in English/language arts, mathematics, history/social studies, science/technology, world languages, the arts, and health.[2] These frameworks, which would "help schools choose curricula by specifying the academic content that students should be able to master," were to be built to provide students a traditional, content-rich liberal-arts education.[3]

Despite the statutory authority, progress toward these curriculum frameworks, or standards, wasn't always smooth. Initial drafts emerging from the Massachusetts education establishment were disappointing, and the reform was in danger of wilting. Weld responded to the stalling tactics by persuading firebrand Boston University president John Silber to head the state Board of Elementary and Secondary Education (BESE). The Democratic legislature agreed to give Silber what he wanted—a shakeup of BESE. After tumult on the board and Silber's departure from BESE, and with the assistance of solid scholars and content advocates, including Abigail Thernstrom, Roberta Schaefer, Edwin Delattre, and Sandra Stotsky (who worked within the state department of education as senior associate commissioner for academic affairs), the process of writing the curriculum standards kicked into overdrive.[4]

After a lengthy public debate that incorporated input from teachers and subject-matter experts, the curriculum standards were finally approved.[5] By all accounts the new Massachusetts standards represented some of the best in the nation.[6]

> [T]he frameworks were internationally benchmarked, with an eye toward authentic college readiness. High-quality literature made up about 80 to 90 percent of the English content. In math, students were required to start studying algebra in the eighth grade, years before the National Mathematics Advisory Panel made the same recommendation.[7]

As these demanding standards were implemented in the classroom, measurable improvements in academic performance began to take hold:

> Massachusetts's SAT scores rose for 13 consecutive years, beginning in 1993. The state's scores on the National Assessment of Educational Progress (NAEP) shot up, too: by 2005, Massachusetts students became the first to score best in the nation in all four major NAEP categories (fourth- and eighth- grade reading and math). When the NAEP tests were administered again in 2007, Massachusetts repeated the feat— and did it again in 2009 and then again in 2011. While American students as a whole lag behind their international peers, the 2008 Trends in International Mathematics and Science Study results showed that Massachusetts students were competitive with their counterparts in places like Japan, Korea, and Singapore. The Bay State's eighth-graders even tied for first place internationally in science.[8]

Given the state's well-earned reputation, the creators of the Common Core scheme, abetted by USED, were determined to lure Massachusetts into Common Core. Being able to brag that even Massachusetts decided to replace its standards with Common Core would go a long way toward easing other states' concerns about the quality of the national standards.

The problem for the Common Core advocates was that the Massachusetts standards were demonstrably superior to the national standards and had led to historic gains on every national and international measure of K–12 student achievement. The Massachusetts frameworks were internationally benchmarked[9]; Common Core (despite false claims to the contrary[10]) isn't.[11] The Massachusetts English language arts (ELA) standards were heavily weighted toward classic literature; Common Core slashes the time spent on such works to less than 60 percent in English class alone.[12] The Massachusetts standards had children learning algebra in eighth grade; Common Core delays Algebra I until ninth grade.[13] Even the Thomas B. Fordham Institute, which has staunchly supported Common Core after receiving millions from Common Core financier the Bill & Melinda Gates Foundation[14], had to admit the Massachusetts standards were superior to the national standards in many respects.[15]

So USED and its Common Core collaborators lured Massachusetts into the national scheme the old-fashioned D.C. way—with federal incentives. Offered $250 million in RttT money if they would agree to adopt Common Core, officials in the administration of then-Gov. Deval Patrick and the Massachusetts Department of Elementary and Secondary Education agreed.[16] Thus, beginning in 2010, Massachusetts transitioned from its proven standards to Common Core.

A word about statewide testing is in order here. The MCAS tests created by the Education Reform Act were initially retained after the transition to the Common Core standards, but over several years (culminating in 2015) they were gradually modified to align to Common Core rather than to the previous Massachusetts standards.[17] Not surprisingly given the inferiority of the new standards, evidence began to surface that at least the 10th-grade MCAS tests were being "dumbed down" (10th-graders' MCAS scores were holding steady, even though their scores on the National Assessment of Educational Progress, or NAEP, were declining[18]).

During the transitional period, BESE voted to join one of the two national testing consortia created as part of RttT: the Partnership for Assessment of Readiness for College and Careers (PARCC).[19] While the PARCC assessment was being developed, debate raged in Massachusetts about what to do about testing. The state had already watered down the MCAS and align it with Common Core; so, why not, some asked, just go with PARCC?[20] Eventually BESE decided to rely on a revamped MCAS instead.[21, 22] Unfortunately, not only are the current MCAS tests (known as MCAS 2.0) fully aligned to the Common Core standards, the revisions to the tests now also incorporated numerous elements of PARCC.

How has the move from excellent standards and tests to Common Core and its aligned tests worked out? One of the best ways to answer that question is to rely on the NAEP assessment (the so-called "nation's report card"), which is administered every two years in reading and math to a sampling of fourth- and eighth-graders in every state. Between 2011 and 2015 (the Common Core era), Massachusetts was one of 16 states in which NAEP reading scores actually fell, and one of 39 states in which NAEP math scores fell.[23] From 2013 to 2015 alone, Massachusetts scores declined in three of the four testing categories.[24]

Evidence of a decline in the performance of Massachusetts students is also observable on the SAT. Since 2006, those scores have dropped by nine points in reading, 10 points in math, and 15 points in writing.[25] The writing decline, especially, suggests that the reorientation of English class from classic literature to the "informational texts" of Common Core may be bearing bitter fruit.

In 2016 the state began a process to end the confusing series of alterations by revising and aligning the state's academic standards and tests. In March 2017 BESE approved revisions to the state ELA and math standards.[26] The purpose of this report is to answer two questions: Are these latest revisions substantial or superficial? Do they signal a return to the quality of the pre-Common Core standards, or continue the trajectory of Common Core? These questions are addressed by recognized subject-matter experts Dr. Mark Bauerlein (English) and Dr. R. James Milgram (math), both of whom have extensive knowledge of Common Core and of the pre-Common Core Massachusetts standards. Their answers, while not surprising, will disappoint the commonwealth's parents and other citizens who had hoped for a return to the glory days of Massachusetts education.

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2017 Massachusetts English Language Arts and Literacy Framework

Introduction

Apart from the verbal skill deficiencies that high-school students in Massachusetts fail to overcome during their years in the classroom, the great danger of the current English Language Arts curriculum is that students leave high school with meager *domain knowledge*. If the standards that are to guide the curriculum do not broach the actual, specific subject matter of the discipline, then the education of students in English falls short. Students may acquire certain skills—the current standards are broken up into Reading, Writing, Language,

and Speaking/Listening, which each have their skills side—but their knowledge of literature, language, and criticism never develops.

We raise the issue because this is what we see in the 2010 standards and even more so in the new ones. The skills elements in the four areas are solid, but not the knowledge areas. The Writing and Speaking/Listening strands, along with the "comprehension" parts of the Reading strand and the grammar and style parts of the Language strand, emphasize a student's ability to **do** certain things. We find those areas well-constructed and appropriate. Teachers who align their instruction to them will produce proficient students when it comes to verbal talents.

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But when it comes to what students should **know**, we find serious deficiencies. A teacher might follow the new standards to the letter and impart only a narrow range of the literary-historical and critical knowledge essential to the discipline. Students may graduate high school knowing little of:

- the history of the English language;
- English literature from *Beowulf* to Joyce;
- great eras of poetic creation (Romanticism, Modernism,…);
- the prime task of criticism, which is to distinguish superior works from lesser works.

It is true that the existing standards do contain one strong literary-historical element in American literature ("*Demonstrate knowledge of eighteenth-, nineteenth- and early-twentieth-century foundational works of American literature, including how two or more texts from the same period treat similar themes or topics*"). But the subject matter of English language and literature extends well beyond our own national tradition. To include no parallel standards pertaining to the British literary tradition, to important eras of world literature, and to critical judgment per se is to leave students less prepared for post-secondary study.

The knowledge deficits take their toll as students proceed to the next level. When they enter college and the teacher mentions the Renaissance or *The Aeneid* or Kafka, they don›t get the reference. When faced with two poems, one a lyric by John Donne, the other lyrics from a pop song, they cannot explain why one is superior to the other. They lack cultural literacy and aesthetic discrimination, and it disadvantages them again and again in courses in history, literature, politics, art, and society.

Unfortunately, students who haven't gained broad humanistic

learning in high school won't get much of it in college, either. Teachers don't have the time or disposition to lead students step-by-step through complex texts and unfamiliar contexts. They ignore the duty of drawing youths out of their adolescent taste and into the appreciation of classic expressions, sometimes because of an ideological discomfort with such value judgments, but more often because the cultivation of discernment in students requires too much attention. Classes meet only 2½ hours per week, and lecturers and professors in the humanities have other pressures besides teaching. Students are left largely to themselves.

The knowledge and criticism deficits often prove a dividing line. A student who read Genesis, Exodus, the Psalms, and the Gospels (King James) in high school has an automatic head start in U.S. history and culture classes over students who didn't. Lines from Abraham Lincoln make more sense to those who hear the Old Testament echoes. They have the equipment to understand the religious imagery of the Civil War in literature and art and political speeches. The students who didn't read any of the Bible in high school or at home have to catch up, and they often feel lost and overwhelmed.

We should add a personal dimension to the problem as well. A youth who has not been schooled in classics of literature and art in coherent sequence, and who has not been trained to recognize the difference between superb and mediocre literature, has been deprived of a precious humanizing influence. If he hasn't been exposed to the best traditions in a systematic, cumulative way, if he hasn't been taught a body of monumental works that make up the story of civilization, he has been robbed of a birthright. Every student deserves that inheritance. The legacy continues, however, only through a curriculum that frankly and directly tells students, "Here is a corpus of human creation that is essential to your moral and intellectual growth."

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The latest revisions to the Massachusetts ELA Standards shy away from doing that in any concrete, specific way. As outlined in the *2017 English Language Arts and Literacy Framework*[27], the new standards downplay subject matter, generally preferring phrases such as "high quality and challenging texts" instead of individual works and traditions. We have supplementary materials in the *Framework* that speak generally about great works, but the standards themselves skirt them. As currently written, they will, in fact, only worsen the

domain-knowledge problem.

That is the unavoidable conclusion one draws after poring over the changes officials have wrought on an already weak set of standards issued in 2010. They do not raise the content requirements of the discipline; on the contrary, they lower them. Aside from some "foundational works" of American literature, they do not distinguish any traditions that are particularly necessary. They do not conceive of criticism as an essential task of value judgment. It is, indeed, discouraging to witness a state-sponsored body of experts delete some things and add others in a process that will only break down the disciplinary knowledge students are supposed to acquire into a haphazard, ill-defined corpus that barely merits the term *disciplinary*.

As the following analyses will demonstrate, the revisions amount to one more step in curricular incoherence. It is another case of English abandoning any aspiration to graduated, cumulative knowledge. The authors of these revisions do not respect literary history. They do not care about the development of the language in and through its best practitioners, at least not enough to insert them explicitly into the standards themselves. The English and European traditions are something to displace, not preserve. The practice of criticism as the discrimination between better and worse is to be avoided. The new standards will not improve ELA instruction. They will hinder English from having any distinctive, settled domain knowledge at all.

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Analysis

There are four serious drawbacks in the added and revised standards:

A. No philology

B. No English and world literary history

C. Displacement of the United States

D. A multiculturalist vacuum

The first two problems mark a simple but far-reaching failure of the standards to provide students with significant knowledge of language and literature. The second two create a more complicated, but no less deleterious outcome for Massachusetts students. They reveal an ideological intention to substitute a watery, superficial diversity for any literary patrimony. We shall explain them one by one.

Philology—The study of the history of the language one speaks is a fundamental part of a humanities formation. It increases students' vocabulary (for instance, through exercises in etymology); sharpens grammar and style (by exposing students to prose models from the past); and teaches them the sciences of phonetics and lexicography. It also inculcates a historical feel for the sentences they speak and write, drawing adolescents out of the present and into the long descent their language has followed from the Middle Ages to today. Students absorb important background knowledge by learning about events such as how the Norman invasion melded Old English with Middle French to produce Middle English. They end up with richer mental lives when they know the derivation of *Vermont*, *Massachusetts*, *preposterous*, and *enthusiasm*. Language comes to seem to them a more imaginative, expressive medium.

College teachers understand well the impact of prior philological learning. They observe all the time how a little of it helps students with reading assignments, for instance, when they face texts from faraway times and places, as well as old and new texts filled with Latinate diction. Additionally, we should mention, philology aids students when they take standardized tests (sections of which amount to little more than vocabulary tests).

Unfortunately, the new standards ignore this reality. The College and Career Readiness Anchor Standards for Language page (p. 24) has a brief statement on "Knowledge of Language," but it only broaches grammatical and stylistic correctness. The 2010 standards based on Common Core contained a small element of etymology (Language Standard 4, "*Use common, grade-appropriate Greek and Latin affixes and roots as clues to the meaning of a word*"), it is true, and the new version maintains it. But it is inadequate. First of all, it is overly abstract—that is, a pairing of phonemes outside of any lexical or historical context. Worse, it addresses only a small part of philological knowledge.

We could remedy this gap quite simply with a language standard in the later grades that reads:

> *Demonstrate knowledge of the history of the English language from Old English to the present.*

This standard would presume study of phonetics (English pronunciation in former times), lexicography (for instance, efforts to standardize orthography in the 16th and 17th centuries), and historical events (how immigration and geography affected the American language). It would be easy to meet, too, either as a discrete sub-area of study or integrated with the study of older literature.

That nothing like this appears in either the 2010 standards or the newly revised standards, despite its obvious importance to the discipline of English, poses serious questions about the disciplinary competence of the authors of the new (and

Common Core) standards. Did they study philology as part of their own formation, but choose not to offer the same education to students in Massachusetts? Or have they never studied philology themselves and don't realize its value?

Missing English and World Literary History—The new standards treat English and world literary history as an option, not a necessity. In an introductory note in the *Framework*, then-Commissioner Mitchell Chester guaranteed the new standards will ensure that students are exposed to "a rich diversity of high-quality, authentic literature from multiple genres, cultures, and time periods," and there is an Appendix B ("A Literary Heritage") of "suggested" readings filled with classic authors. The headnote to the Appendix list says that students "should acquire knowledge of a range of literary works reflecting a common literary heritage that goes back thousands of years to the ancient world." It emphasizes, too, the "particular heritage in the English speaking world."

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But, as we know, suggestions are not binding. If subject matter isn't in the standards themselves, only raised in supporting materials, it may or may not end up in the classroom. We have seen this happen in Common Core, where we had estimable appendices filled with great works of literature and thought, but very little of that literary-historical tradition in the standards themselves. As a result, the tradition could easily be diminished, as it was when the National Council of Teachers of English developed a teacher guide to the ELA portion of Common Core and, for example, taught *The Odyssey* through the lens of *Star Wars* and NPR segments on soldiers and violence. (See a prior report from Pioneer Institute, Bauerlein and Stotsky, *How Common Core's ELA Standards Place College Readiness at Risk*[28].)

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We should add that Appendix B also contains dozens of authors of decidedly second rank. The general demand that students become immersed in a "common literary heritage" sounds the right note with conviction, but we question how serious the authors are when we find that demand absent from the standards themselves. If the authors want students to learn that heritage, they must say so. But that would mean the authors would have to identify what that heritage is, an act that would undoubtedly appear too Eurocentric and Western Civ-like to meet the multiculturalist requirement discussed below.

In other words, the authors want to have it both ways. They acknowledge the importance of the Western and English literary traditions, but allow teachers the freedom to respect them or to de-emphasize them. This latitude is reinforced in many ways in the new framework. For example, the second part of Appendix B abandons the old inheritance entirely, covering instead the late-20th and early-21st centuries. We have the same note of conviction, but this time for a half-century of writing, not for the preceding 2,300 years.

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The opening of this second part reads:

> *All students should be familiar with American authors and illustrators of the present and those who established their reputations after the 1960s, as well as important writers from around the world, both historical and contemporary.*

Once more, we have a hopelessly broad subject matter, American and non-American, even illustrators as well as authors. The section gives contemporary literature as much attention as the previous section gave to Shakespeare, Dickens, Bronte *et al*. The mere balance of contemporary with classic diminishes the latter, for when you give Cornel West (a lively thinker but an inferior writer) equal billing with Henry Adams, the historically great and the currently interesting are flattened to the same condition. It asks students to suppress their critical judgment, to recognize one as just as meritorious as the other. (We shall come back to this point in our conclusion.)

Another act of diminishment appears in the College and Career Readiness Anchor Standards for Reading (p. 21), which state:

> *To build a foundation for college and career readiness, students must read widely and deeply from among a broad range of high-quality, increasingly challenging literary and informational texts. Through extensive reading of stories, dramas, poems, and myths from diverse cultures and different time periods, students gain literary and cultural knowledge as well as familiarity with various text structures and elements.*

The only organizing principle of this "broad range" of texts

is "diverse cultures and time periods," which isn't much of an organizing principle at all. It encourages a smattering of diversity in the area of literature, not a sequential introduction to a different corpus of writing. As we explain below in the section on "multiculturalist vacuum," such a vague and general standard does not guarantee "literary and cultural knowledge." More likely, students pass through this curriculum and end up with dimly remembered exposure to this novel and that essay, not a solid, retained familiarity with another culture and another time period.

In those brief moments when the standards do refer to English and world literary traditions, they get the learning process backwards. In the 8th Grade Reading Standards for Literature, the section on "Integration of Knowledge and Ideas" has this:

> *Analyze how a modern work of fiction draws on themes, patterns of events, or character types from myths, traditional stories, or religious works such as the Bible, including describing how the material is rendered new.*

We approve this recognition of the influence of the past on the "modern," but have a simple question. If those traditional materials are important to the present, why not ask students to begin with those materials, not with contemporary works that bear traces of them? The assignment asks students to work backwards, which they shall do in partial fashion, searching old works only for those anticipations of current works. They will not read large portions of Ovid's *Metamorphoses*, just those moments of Narcissus, Daphne, etc. echoed in contemporary writing.

The revision inserts "pre-20th century documents" in place of "seventeenth-, eighteenth-, and nineteenth-century foundational U.S. documents." The standard is now so open and broad as to have no curricular impact at all.

This neglect of English and classic world literature is a terrible choice. All the talk about "challenging literary and informational texts" amounts to just that—empty words. If the standards themselves do not identify the subject matter that must be learned, they open the discipline to a debilitating question: who's to say what is and isn't challenging? Why isn't Bill Moyers's journalism just as worthy as George Orwell's essays? Both of them show up in the Appendix list, in spite of the many and (in our eyes) legitimate complaints against Moyers' tendentious and manipulative presentations.

In other words, a list of suggested works that includes English and world classics among many other works does not ensure the survival of that canon. The genius and sublimity and beauty of Sophocles' drama, Wordsworth's poetry, and Nietzsche's

prose are left to chance. The words and ideas that meant so much to the Founders of our country, and to the great artists and thinkers of recent times, are in the Massachusetts ELA standards just one possibility among many others. It was but a few decades ago that senior-year English was devoted to six centuries of British literature. Readings from Chaucer to Virginia Woolf came together to form the story of English, the supreme talents in historic order. They formed an impressive corpus just as coherent and authoritative as chemistry and calculus did in other classrooms.

But not for the authors of the Framework. To them, *Macbeth* and *The Aeneid* are challenging works, but so are the comedies of Neil Simon and the writings of Garrison Keillor (both are in Appendix B). This is a lowering of challenge and a break-up of our literary heritage.

Displacement of the United States—The 2010 standards contain an important civic-literacy historical component. It says:

> *Analyze seventeenth-, eighteenth-, and nineteenth-century foundational U.S. documents of historical and literary significance (including The Declaration of Independence, the Preamble to the Constitution, the Bill of Rights, and Lincoln's Second Inaugural Address) for their themes, purposes, and rhetorical features.*

This standard has been revised. The new version reads:

> *Analyze pre-20th century documents of historical and literary significance (e.g., the Magna Carta, the Declaration of Independence, the Declaration of the Rights of Man, the Preamble to the Constitution) for their themes, purposes, and rhetorical features.*

The revision inserts "pre-20th century documents" in place of "seventeenth-, eighteenth-, and nineteenth-century foundational U.S. documents." The standard is now so open and broad as to have no curricular impact at all. Without "foundational" in the language, we no longer observe the difference between works that are supremely consequential in history and those that are merely "significant." American and non-American works have equal qualifications. Under this guidance, a teacher may drop one of the *Federalist Papers* and add *The Communist Manifesto*. While we believe that all students should read the *Manifesto* at some point in their education, it should not be used to fulfill this (formerly) U.S. civic literary standard. In the new version, both texts qualify for the standard, which now amounts to little more than "Teach important pre-20th-century texts." It doesn't imply any structure or chronology, either. The instruction is so loose that 10 teachers could follow it and develop sharply divergent courses.

One must assume that this is the point. The authors of the new standards do not wish to identify foundational works as a first priority. They do not want to assemble any kind of "story" of great documents, no tradition of, say, democratic thought from the ancient Athenians to the Founders through

various Supreme Court decisions and constitutional amendments. They refuse to single out any texts as necessary. And they don't want an exclusively American focus.

The alterations in the examples from the 2010 standard to the new one prove it. The previous standard provided a coherent line-up of texts in the parenthetical phrase, four works that form a single national and historical lineage (Declaration, Preamble, Bill of Rights, and Lincoln's Second Inaugural). One can identify the curricular focus easily and fill in more material that follows from it: some of the *Federalist Papers*, various constitutional amendments, Frederick Douglass's speech on the Declaration and the 4th of July, and Martin Luther King's glosses on the Declaration, not to mention texts that influenced the Founders and Lincoln, such as Leviticus, John Locke, and Montesquieu. Students would leave the unit with a solid familiarity with the civic philosophy of the United States.

But the new list of examples drops the Bill of Rights and Lincoln. Instead, we have one text from Medieval England and one from Revolutionary France. These two examples break up the coherence of the old list. Yes, there are overlaps, and Jefferson played a role in the second one. But they don't fit well into the American story implied by the first.

We must understand these selections in terms of opportunity cost, not absolute value. Of course, it is worthwhile for students to know of the Magna Carta and the Declaration of the Rights of Man. But it is more worthwhile for them to spend time on the *Federalist Papers*, works that had a formative influence on the country in which they live. The French Declaration didn't show up much in the Civil Rights Movement, but the Declaration of Independence did. The Declaration announced the American Revolution and our glorious beginning. The American Revolution culminated in the Constitution and the Bill of Rights and the relative peace of the early Republic. The French Declaration was followed by the Terror.

Once again, this is a question of relative value, not absolute value. High-school students need more than a syllabus that contains just a series of important texts. They need a syllabus that places those texts in a developmental relationship. In the old version, we had a short but indicative sequence of works that represented the core of America's civic religion. The new version decenters America and breaks up the chronological and national coherence of the documents. It is an intentional displacement, one motivated by the subject of the following section.

A Multicultural Vacuum—The Reading Literature Standard 10, which runs throughout the grades, has been revised. There are slight variations in the language of Standard 10 for different grades, but the version for Grade 12 reads:

> *By the end of grade 12, read and comprehend literature, including stories, dramas, and poems, at the high end of the*

> *grades 11–CCR text complexity band independently and proficiently.*

This is a general requirement that teachers teach students to recognize literary features and explain/analyze their meaning. It doesn't stipulate any content except literature. The "including" phrase doesn't rule out other genres such as literary essays, but only ensures that the curriculum include fiction, drama, and verse, each of which exerts distinctive demands on readers.

The new standard inserts a content requirement that wasn't there before. It reads:

> *Independently and proficiently read and comprehend literary texts representing a variety of genres, cultures, and perspectives and exhibiting complexity appropriate for the grade/course.*

The key word here is "cultures." It makes a familiar demand for cultural diversity, one of the ideals of our time and a way for the authors to bring Massachusetts standards into our more multicultural 21st century. The common rationale for raising cultural diversity into a disciplinary requirement is a representational one (as the criterion "representing" in the standard makes explicit). The United States is becoming more demographically diverse, and we no longer inhabit a predominantly white, Eurocentric culture. The curriculum must reflect that variation to prepare youths for citizenship in the multicultural polity.

The *Frameworks* document makes this point explicitly, stating:

> *Students appreciate that the twenty-first-century classroom and workplace are settings in which people from often widely divergent cultures and who represent diverse experiences and perspectives must learn and work together. Students actively seek to understand other perspectives and cultures through reading and listening, and they are able to communicate effectively with people of varied backgrounds. They evaluate other points of view critically and constructively. Through reading great classic and contemporary works of literature representative of a variety of periods, cultures, and worldviews, students can vicariously inhabit worlds and have experiences much different than their own.*

That's the idea, and it has a common-sense air. But, in truth, three dubious assumptions underlie it.

One, why should a discipline whose materials date back many centuries be submitted to social demands of the present time? Why is English charged with inculcating a socio-political vision? The only way to justify this "presentism" is to say that knowledge of classic European and American literature is less important than is awareness of literary works from other nations and cultures, including contemporary American multicultural settings. In other words, diversity sensitivity prevails over traditional literary-historical knowledge. We may infer that the authors of the revision believe that a diversity-sensitive attitude toward the world is a good in itself. To know

that there is an Afro-Caribbean literature is, perhaps, more valuable than knowledge of the great age of satire (Dryden, Pope, Swift).

This raises the second errant assumption, namely, that this standard as constructed and implemented will, indeed, plant a cultural-diversity consciousness in Massachusetts students. The problem lies in the fuzziness of the language. All we have is the requirement that teachers fill their syllabi with materials drawn from different cultures. It doesn't specify anything else.

The generality is intentional. The "Quick Reference Guide to Proposed Changes in 2017" states that one reason for this revision project is that educators in Massachusetts have told state officials that the existing standards "were too narrow and specific." It is true that their opinion applied specifically to the limitation of literary analysis to fiction, poetry, and drama in the 2010 standards; hence, the new standards open up the curriculum to other genres and "allow teachers more choice." But the same relaxation lies behind the "other cultures" revision and supports the more-diversity impulse. The "Rationale for Change" statement inserted next to the revised "cultural variety" standard says that the purpose of the revision is to "clarify and broaden expectations for the range of texts students encounter."

That rationale sounds like a raising of the bar, but in truth it lowers the bar and clarifies nothing.

That rationale sounds like a raising of the bar, but in truth it lowers the bar and clarifies nothing. The generality of the new language gives teachers no guidance as to which cultures and what time periods they should incorporate into their lessons, another case in which generality serves the purpose of fuzziness, not freedom. It actually licenses the avoidance of challenging texts from the past. Does the world of Renaissance England count as another culture? Does the "perspective" of Ovid count as a "variety" contributor? They should. Certainly the outlook of John Milton differs more from the world view of the Boston 12th-grader than does the outlook of a contemporary critic from the Middle East. But we may be sure that Milton isn't what the authors of the new revisions had in mind when they called for other "perspectives" and "cultures."

The new standard leaves everything open, and it also presents no knowledge benchmark relative to the other cultures and perspectives that are to be represented. That's why the resultant learning should be called "awareness," not knowledge. For a student to build up genuine understanding of another culture, a more systematic approach is needed. A middle-school teacher who likes Latin American novels must provide ample and patient scaffolding for the one she assigns. Students must learn a little about the history, religion, politics, geography, language, and mores of the culture out of which the novel

springs. Only then does the novel become an effectual object of study in the classroom.

That's not all. If the teacher chooses a Latin American novel, will that be the only literary representative of Latin American culture? This leads us to the third assumption, that is, that we needn't develop any cumulative organization of these multicultural materials. The language of the new standard implies that when it simply says, "Teach diverse works." But one work is not enough to produce a "representational" understanding of another culture. No work of literature has its meaning in itself. As T. S. Eliot said, "No poet, no artist of any art, has his complete meaning alone. His significance, his appreciation is the appreciation of his relation to the dead poets and artists. You cannot value him alone; you must set him, for contrast and comparison, among the dead." If we want something on Latin American literature, we need to develop a multi-week unit that includes several Latin American works as well as copious contextual materials about that culture.

It actually licenses the avoidance of challenging texts from the past.

We need a standard, then, that does more than say, "Add a few works from other cultures to the assigned readings." A better one would read,

> *Demonstrate knowledge of a literary-tradition or period of a non-Western culture.*

Or,

> *Examine the development of a particular literary genre in a non-Western culture.*

The point would be to have students learn one or two other cultures in some depth. Ideally, these units would be complemented by units in social studies and art that cover the same times and places.

We are skeptical, however, that the authors of the revisions would favor this deeper approach. We take their words at face value. They prefer a relaxed, superficial approach to course materials. To select one or two non-Western cultures for probing study might end up overlooking too many other cultures. We wonder, too, whether the authors worry that a deeper study of those other cultures might expose features that students would inevitably judge harshly. In any case, the authors demand breadth and variety, a sampling of this and that and that. They aim for a diversity-consciousness, not immersion in another world. Little of the learning students do will stick, however, not without the reinforcement of complementary works and knowledge.

We note here, also, that these and other related diversity revisions in the standards at the high-school level have an added justification, say the authors. It is that the changes will bring the Massachusetts standards "into better alignment with the

study of English language in higher education." The alignment goal is a longstanding one, of course, and it shows up routinely in college-readiness initiatives such as Common Core. But one has to wonder at the use of an anchor that in recent years has undergone a disastrous fall in popularity and prestige. By any material measure, the study of English has fallen: enrollments in classes, percentage of majors in the general undergraduate population, the portion of English classes taught by graduate students and adjuncts, the distribution and citation of English literary research, and administrative funding and support. The intellectual prestige of English, too, has declined. Forty years ago, an institution couldn't claim first-rank status unless it had a flagship English department. That is no longer true. Literary studies have suffered a series of embarrassments that have made the humanities the focus of ridicule among many public intellectuals and colleagues in the sciences. These episodes include best-selling books (*The Closing of the American Mind, Tenured Radicals, Illiberal Education, Education's End*), the Sokal Hoax, the Bad Writing Award, the Duke lacrosse case (many professors who rushed to judgment were in English), and the current craze of identity politics. It is widely believed that the discipline is in bad shape, though people disagree as to the causes and symptoms. At such a time of flux and diminishment for English at the post-secondary level, it is imprudent to make alignment with it a primary criterion of revision.

2017 Massachusetts Mathematics Curriculum Framework

Introduction

The next question before us is whether the new Massachusetts K–12 mathematics standards are any better than the Common Core standards that Massachusetts adopted seven years ago. Those standards were already associated with clear drops in Massachusetts' previous math outcomes both on our national mathematics exam, the NAEP, and the international Trends in International Mathematics and Science Study (TIMSS) exam, which previously showed that Massachusetts students were entirely competitive with the students from the highest-scoring nations in the world. The 2011 TIMSS exam showed that Massachusetts students were first in the nation and fifth in the world under the standards that preceded

Common Core[29], but in 2015 Massachusetts did not participate in TIMSS, taking the PISA exam instead. On PISA, although Massachusetts continued to perform very well compared with the U.S. as a whole, its performance against the highest-scoring nations dropped to 12th place, outperformed by seven other nations.[30]

This analysis focuses on the two major areas that students need to learn in grades one through eight: basic arithmetic, and perhaps somewhat surprisingly, ratios, rates, percents, and proportions. Many people would object that rational numbers should be the second topic, but a solid understanding of fractions depends, crucially, on understanding how ratios work. Moreover, it is ratios and proportions that are the gateway to the more advanced mathematics—comprising at least real statistics, real data analysis, linear algebra, and even calculus—that students have to be capable of learning if they are to succeed in most non-McDonald's-level jobs and in college.

The finding was that—aside from a tiny number of added phrases that do not impact the mathematical content in the arithmetic, ratio, rate, percent, and proportion standards in any way—the new document is identical to the, clearly failed, previous one. (But see footnote 37, which notes that the added material in 6.RP.3d is so badly chosen that it cannot be sensibly handled until students know calculus.)

The following discussion records all the relevant standards (with the added phrases italicized) so the interested reader can easily see what the actual changes are as well as identifying the relevant standards. Moreover, it compares these standards with those of high-achieving countries—our current international competitors[31]—in detail, and, it is hoped, explains why the new Massachusetts standards are so very problematic.

Just doing the above, however, seemed to not give the typical reader a sufficient sense of the differences in level that we are actually talking about. Simply saying—as this analysis initially does—that *Massachusetts students following these new standards are and will remain fully three or more years behind students in high-achieving countries in both these areas by seventh grade* does not indicate either the true magnitude of the resulting problem or its consequences. As a result, it seemed crucial to include extensive examples of actual problems that students in those countries are expected to be able to solve.

It is worth noting that the many sample problems included are

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not only extremely challenging for our students, they are very difficult for most of our teachers. Yet they illustrate and test exactly the levels of problems students must be able to work to properly handle the more advanced mathematics that virtually all contemporary students need if they hope to work in any technical or health-related occupations, as well as a constantly growing list of other areas.

The programs used in the high-achieving countries (except Japan[32] and India) stem from the program developed in the old USSR[33] in the late 1930's and early 1940's.[34] For this reason, the study concentrates on representative questions from Japan and the old USSR since, in both cases, they use a limited number of nationally approved texts. It is also interesting to note that Japan decided to use our K–12 math programs and teaching techniques around 1999. But the Japanese had to abandon those ideas after about seven years as the preparation of the students entering their universities dropped so dramatically during that time.

The final part of the analysis focuses on the most significant of the new eighth-grade standards. These are identical to the corresponding Common Core standards, but unlike the lower-grade standards, which are concerned with very standard topics, they focus on somewhat unusual aspects of the beginning topics in Algebra I. This unusual perspective turns out to also be the focus of the (lower) high-school-level mathematics—Algebra I, Geometry, and Algebra II or their "integrated" equivalents—that comprises the material on the further pages of the new document. Moreover, it is very doubtful that the approach to those topics developed in this new document prepares students for more advanced work.

A reproduction of five more sample problems follows the analysis and critique of these eighth-grade standards. The problems are taken from the beginning problems in a collection by the very well-known Soviet mathematician V. I. Arnold of problems that students were expected to be able to solve from seventh grade onwards in the USSR, but which even my United States students at Stanford had great difficulty solving.

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expected to have in mathematics and what the current document actually expects to develop. This is in spite of the claim by the authors that the material in the document prepares Massachusetts' students to be globally competitive.

The Myth of 21st-Century Mathematics

Before the main analysis can be presented, it is necessary to discuss the idea promulgated by proponents of the Common Core that there is such a thing as 21st- mathematics, such that the mathematics learned by students even 30 years ago is now obsolete. Their claim is that this 21st-century math is focused on problem-solving so that the main focus of instruction *should be on the generalized subject of problem-solving.*

The truth is radically different. There is no such generalized subject, and the main objective of math has always been on its use as a crucial tool in solving problems not only in mathematics but in the sciences and any other precisely defined subject of human endeavor. But in practice, one finds that before problem-solving can begin in any area, the person attempting it has to know as much as possible about that area and the mathematics that most likely will be necessary. There is no known shortcut.

It is true that over the last 200 years, mathematics has progressed dramatically beyond the great work of mathematicians 2000 years ago. However, almost none of this new math can be either applied or even understood without thoroughly mastering the mathematics that came before.

Mathematics is entirely hierarchical. This means that the mathematics a student studies in, for example, fifth grade depends essentially on the mathematics studied in all earlier grades, and the surest recipe for failure is trying to learn a topic in mathematics without thoroughly understanding the earlier material on which it depends. As a more explicit example, for students to understand and use calculus or linear algebra they not only have to know ratios, rates, and proportions, they have to master them at the level illustrated by the problems in these areas that are included here.

It is widely claimed (in the world of our education schools) that now that we are living in the 21st century we should be

studying "21st-century mathematics," and all that old stuff such as proportions and fractions is irrelevant and outdated. This is flat-out wrong. Even the mathematics that was developed over 2,000 years ago is as essential (and correct) today as it was then. But there *are two subjects* in mathematics that have become far more important today than they were previously: 1) algorithms and computers, and 2) statistics and data analysis. Therefore, these subjects should be covered adequately in the current document—which, of course, is not only not the case, but is as far from actually happening as possible.

Indeed, one of the keys to the power of the current Chinese math curriculum is its lower-high-school course on algorithms, statistics, and data analysis. But when one looks at the details of the standards for that course, one sees that it depends essentially on virtually all the math that comes earlier.

It is widely claimed (in the world of our education schools) that now that we are living in the 21st century we should be studying "21st-century mathematics," and all that old stuff such as proportions and fractions is irrelevant and outdated. This is flat-out wrong.

Here, in their own words, is the explanation of the course[35]:

Contents of algorithm[i] in this module pertain to the establishment of connection of algorithm in mathematics and computer technology so as to express algorithm in a formal manner. For those schools that are better resourced, teachers should strive to use computers for its realization. Because of the need to express algorithm systematically and clearly, teachers generally are required to organize problem solving processes as procedural block diagrams. In order to operate the algorithms on computers, teachers need to translate natural languages or procedural block diagrams into computer languages. The primary objective of this module is to enable students to realize the ideas of algorithm, and elevate logical thinking capacity.

Students learns some data processing methods, and deploy the knowledge and methods acquired to solve practical problems. For example, during learning of contents of linear relationships, teacher can encourage students to explore a multitude of methods to ascertain the linear regression straight line. Based on this foundation, teacher can guide students to realize the idea of method of least squares and to find the linear regression equation according to given formulae. For those students who are interested, teacher can encourage them to attempt to derive linear regression equations.

Of course, even this material is significantly simplified when compared with the actual content in these areas that students will see and need in either college or the workforce. In both cases, a full course in linear algebra is essential, and multi-variable calculus is almost as important in data analysis and statistics.

In any case, here is a more detailed discussion of Chinese expectations for algorithms:

Through imitation, operation, and exploration, involve in expressing the processes of problem solving while designing block diagrams. During the processes of solving practical problems (e.g. solving of problems involving system of linear equations in three unknowns), comprehend the three basic logical structures of block diagrams: sequence, conditional branch, and loop.

Basic algorithmic statements:
Involve in the process of transforming procedural block diagrams of concrete problems into program statements; understand a few basic algorithmic statements: input statement, output statement, assignment statement, conditional statement, and loop statement; proceed to realize basic idea of algorithm.

And more details on expectations for data analysis and statistics:

Example 3 A large quantity of beans is randomly scattered on the diagram shown (may use calculators or computers to model this process), calculate the ratio of beans fallen inside a circle and that fallen inside a square. Based on these estimate the value of π, and begin to realize the meanings of geometric probability model.
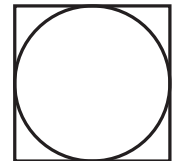
The draft standards for this course also include a large number of sample problems, but by far the majority refer to the standard material that has been taught in this country (poorly) and the high-achieving countries (excellently) for a very long time.

These problems are basically identical to the questions that appear on Chinese, USSR, and Japanese exams throughout the 1980's, which are more readily available than problems from more recent exams. For this reason, in the discussion that follows, our examples are all taken from these earlier documents except for the last five, which are taken from a 2004 article by the very important mathematician V. I. Arnold.

The point here is that even the areas of mathematics that are more prominent in the 21st century require a strong foundation of basic mathematics—a foundation taught in countries such as China, but that will not be taught under the new Massachusetts standards.

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i Algorithm definition: a procedure for solving a mathematical problem (as of finding the greatest common divisor) in a finite number of steps

Analysis

Basic Arithmetic

The key first-grade new Massachusetts math standard relating to addition and subtraction is 1.OA.6 stated below. In practice, it is the standard that first-graders will spend the most time learning.

Add and subtract within 20.

6. Add and subtract within 20, demonstrating fluency for addition and subtraction within 10.
   Use mental strategies such as
      counting on;
      making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14);
      decomposing a number leading to a ten
      (e.g., 13 − 4 = 13 − 3 − 1 = 10 − 1 = 9);
      using the relationship between addition and subtraction
      (e.g., knowing that 8 + 4 = 12, one knows 12 − 8 = 4);
      and creating equivalent but easier or known sums (e.g.,
      adding 6 + 7 by creating the known equivalent 6 + 6 + 1
      = 12 + 1 = 13).

Very close to the standard above, the second-grade standard for addition and subtraction, 2.OA.2, is presented as follows:

Add and subtract within 20.

2. Fluently add and subtract within 20 using mental strategies. By end of grade 2, know from memory all sums *and related differences* of two *single*-digit numbers.

(The standard 1.OA.6 in the revised Massachusetts standards presented above is identical to the Common Core standard with the same label. The Massachusetts standard 2.OA.2 here differs from the Common Core standard with the same label only by the addition of the material in italics above, but this added material clearly does not change the mathematical content in any meaningful way. The following discussion presents standards from the new Massachusetts document. In each case, they are either identical to the standard with the same label in Common Core, or they have a small number of phrases added which appear in italics.)

1.OA.6 is the most problematic first-grade standard in the new Massachusetts math standards:

- First, this standard is unique in the entire world. No other country has one anything like it.

- Most other countries have a standard that simply says, "Add and subtract (possibly within 20, but more likely, within 100)" with, perhaps, a separate substandard, "Show fluency for addition and subtraction for numbers within 10 (but again, more likely, within 100)."

- First-graders in virtually all high-achieving countries are taught and assumed to understand place-value notation for at least two-digit whole numbers.

Common Core's *second-grade* standard 2.OA.2 covers at least

some of the expectations present in high-achieving countries' *first-grade* standards; consequently, the corresponding Massachusetts standard is already one full year later than what is expected in those countries.

Let us return to 1.OA.6 and the reasons it is so problematic. As the reader can see, the heart of the standard is the long list of different ways of doing the operations. In practice, students spend weeks learning each of these procedures, and their complaints start! It takes forever to do even the simplest addition with this list of methods, and most of these children are already aware of and can use the standard algorithm, which takes just seconds for whole numbers less than 100. The vast majority rapidly conclude that "math is stupid" and quickly lose interest in the entire subject.

Comedian Stephen Colbert offered[36] an excellent discussion of these issues in 2014. One of the key examples he highlighted was a response given by a second-grade student in California:
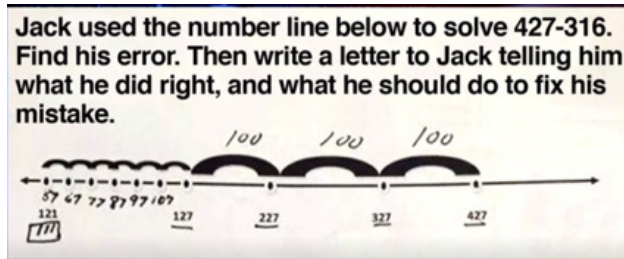

So it is legitimate to ask (as, implicitly, this second-grader did), "Why is this list present?" Actually, the list is a major part of the material that is taught to prospective elementary-school teachers in their (usually required) mathematics methods course in our schools of education—including those in Massachusetts. The situation in these schools of education is that too many of the elementary-school teaching candidates are innumerate and mathematically illiterate. So this list becomes a model for material that can be used to help students having difficulties with the standard methods, in spite of the teachers' possible minimal understanding of the material.

So, if we were to look at a standard for this material for a **mathematics methods course**, 1.OA.6 would be very reasonable. But it's a mystery how or why the three lead writers of the Common Core mathematics standards ever thought this was an appropriate standard for *actual first-grade students*.

At this point in the standards, the standard algorithms for addition and subtraction have not been introduced. In fact, the first mention of algorithms of any kind at all does not appear until grade three. The relevant standard is 3.NBT.2:

2. Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

But it is explicitly pointed out that "*a range of algorithms may be used.*" Colbert gives us an example of how the Common Core tests interpret this standard. The student is expected to jump backwards on the number line from 427 by 316 units! This is entirely inappropriate. Once or twice in the first grade it is appropriate to illustrate subtraction in this way, but in third grade where this standard occurs, this approach is just make-work and is slow, inefficient, and prone to errors.

> Jack used the number line below to solve 427-316. Find his error. Then write a letter to Jack telling him what he did right, and what he should do to fix his mistake.

Finally, in grade four we have 4.NBT.4:

4. Fluently add and subtract multi-digit whole numbers using the standard algorithm.

But this is fully two to three years behind what is expected from students in high-achieving countries.

The situation with respect to multiplication and division is even worse than that for addition and subtraction. In grade two, multiplication but not division is introduced at a very trivial level in 2.OA.3, 2.OA.4:

Work with equal groups of objects to gain foundations for multiplication.

3. Identify patterns in odd and even numbers using concrete models or drawings. Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.

4. Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.

Once more there is a dramatic difference in the requirements here and those in high-achieving countries (including the Massachusetts math standards that directly preceded the state's adoption of Common Core). In all those cases, the standard would simply read, "Fluently multiply two whole numbers less than 100 (or perhaps, less than 1000)." All the teaching methods that are listed in 2.OA.3 and 2.OA.4 as well as others would be wisely left to the teachers' good sense in working with students who might be having difficulties.

In turn, it can safely be assumed that these teachers have seen and worked with these teaching methods in their math methods courses.

Of course, here in the new Massachusetts standards, one does not finish the basic work with multiplication in second or at most third grade, as is the case in high-achieving countries. Moreover, there is no mention of any algorithms for multiplication, something that is typically introduced in grade two or three in high-achieving countries.

In grade three, further work with multiplication (but no algorithm yet) together with elementary properties of division, appears.

The relevant standards are 3.OA.5 and 3.OA.6:

Understand properties of multiplication and the relationship between multiplication and division.

5. Apply properties of operations as strategies to multiply e.

    Examples: *When multiplying numbers order does not matter.* If $6 \times 4 = 24$ is known, then $4 \times 6 = 24$ is also known.

    (Commutative property of multiplication). $3 \times 5 \times 2$ can be found by $3 \times 5 = 15$ then $15 \times 2 = 30$, or by $5 \times 2 = 10$ then $3 \times 10 = 30$.

    (Associative property of multiplication.) *When multiplying two numbers one or both can be decomposed and multiplied.* Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$.

    (Distributive property.) *When a number is multiplied by 1 the result is the same number. (Identity property of 1 for multiplication.)*

6. Understand division as an unknown-factor problem. For example, find $32 \div 8$ by finding the number that makes 32 when multiplied by 8.

Here, the relation with the dramatic slow-down in the handling of addition and subtraction is repeated, and in a way that is close to diametrically opposite of what is done in high-achieving countries. We get the strong impression that these four examples are to be treated the same as the list of methods in the earlier addition/subtraction standards (1.OA.6). But in high-achieving countries, the commutative, associative and distributive properties of multiplication are extensively studied (already in second grade) as the first examples of basic properties of operations that students have seen, and they are used to show how to multiply any two whole numbers, particularly when they are written in base 10 notation.

At the same time students in those countries also study division of two whole numbers, regarded as the inverse operation to multiplication, so that when a student knows how to multiply two numbers she also knows how to divide the product by either of the two multipliers. This is used in high-achieving countries to teach standard division algorithms in the third and sometimes fourth grades. Of course, Common Core (and thus the new Massachusetts standards) separate these operations, and develop the division algorithm in the fourth, fifth, and sixth grade, by which time the standards are fully three

years behind the expectations in high-achieving countries.

The standard algorithm for multiplying whole numbers does not appear until grade five. 5.NBT.5 reads:

5. Fluently multiply multi-digit whole numbers using the standard algorithm.

At this point division "using strategies" are introduced in 5.NBT.6:

6. Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/ or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Note the list of processes. Once more, it seems that all fifth-grade students are expected to work with each of the methods indicated. This is at least two years later than the point where students in high-achieving countries have already learned how to use the standard long-division algorithm for dividing whole numbers. Indeed, these Massachusetts standards wait until grade six to complete development of the basic techniques for division, when we finally have the standard 6.NS.2:

2. Fluently divide multi-digit numbers using the standard algorithm.

Of course, the above estimates apply only to the topics that are being learned. The students in these high-achieving countries are much further advanced in terms of the level of the problems they can solve in these areas. For example, here are some sample problems from the third-grade national textbook that was used in the old USSR during the early to mid-1980's.[37]

> 304. A girl was reading a book. After she had read 14 pages one day, and twice as many the next day, she had 54 pages left to read. How many pages are there in the book in all?
>
> 305. Solve the following equations:
>
> $x : 4 + 150 = 270$ $(a - 420) : 7 = 60$
> $(410 - b) \cdot 3 = 84$ $900 + x \cdot 8 = 1{,}140$
>
> 306. How do the expressions in each pair differ? Compute their values.
>
> (1) $59{,}407 + 124{,}958$ $(59{,}407 - 65) + 124{,}958$
> (2) $501{,}000 - 48{,}364$ $(501{,}000 - 36) - 48{,}364$
> (3) $15{,}724 - 8{,}395$ $15{,}724 - (8{,}395 + 29)$
> (4) $76{,}182 - 5{,}349$ $(76{,}182 + 33) - 5{,}349$

(The colon above is their notation for division. The dot is their notation for multiplication.)

> 559. Arrange the following fractions in decreasing order:
>
> $\frac{1}{9}, \ \frac{1}{3}, \ \frac{7}{9}, \ \frac{2}{3}, \ \frac{5}{9}, \ \frac{2}{9}, \ \frac{4}{9}.$

> 560. Insert the signs <, >, or = in place of the asterisk:
>
> $160 \cdot 2 * 600$ $720 : 9 * 90$ $600 : 5 * 200$
> $160 \cdot 3 * 600$ $720 : 6 * 90$ $600 : 5 * 100$
> $160 \cdot 4 * 600$ $720 : 3 * 90$ $600 : 5 * 150$

Ratios, Rates, Percents, and Proportions

The first essential thing students must learn in mathematics is the basic arithmetic discussed above. But the second, almost equally crucial thing they have to understand is ratios, rates, percents, and proportions.

In Common Core and the almost identical discussion of these topics in the new Massachusetts math standards, the entire (and totally insufficient) discussion is contained in two short sections, one in sixth grade and the other in seventh.

Here are the three sixth-grade standards on ratios, rates, percents, and proportions: 6.RP.1, 6.RP.2, and 6.RP.3. Note that percents only occur in 6.RP.3c, and at a very trivial level, while proportions are not mentioned until grade seven. As before, the additions to the previous Massachusetts standards appear in italics:

In Common Core and the almost identical discussion of these topics in the new Massachusetts math standards, the entire (and totally insufficient) discussion is contained in two short sections, one in sixth grade and the other in seventh.

Ratios and Proportional Relationships

Understand ratio and rate concepts and use ratio and rate reasoning to solve problems.

1. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities, *including the distinction between part: part and part / whole.* For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak." "For every vote candidate A received, candidate C received nearly three votes." "*The ratio of males to females is 2:3, meaning that 3/5 of the group is female.*"

2. Understand the concept of a unit rate a/b associated with a ratio a:b with b≠0, and use rate language in the context of a ratio relationship, *including the use of units.* For example, "This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is 3⁄4 cup of flour for each cup of sugar." "We paid $75 for 15 hamburgers, which is a rate of *5 dollars* per hamburger."

3. Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

a. Make tables of equivalent ratios relating quantities with whole-number measurements Find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.

b. Solve unit rate problems, including those involving unit pricing, and constant speed. For example, if it took 7 hours to mow 4 lawns, then, at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed?

c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.

d. Use ratio reasoning to convert measurement units *within and between measurement* systems; manipulate and transform units appropriately when multiplying or dividing quantities. (*Ex. Solve problems that relate the mass of an object to its volume*).

As can be seen, the additions do not introduce any new mathematics to the discussion.[38] Perhaps less obvious is the totally extraneous sentence, "*For every vote candidate A received, candidate C received nearly three votes,*" which has very little connection with the topic since it is impossible to determine a ratio from it. This is an actual error—and exactly the same error that appears in 6.RP.1 in the original Common Core math standards.

Such errors should never happen.

It should also be emphasized that *in high-achieving countries, ratio and rate problems are already richly represented in grades three or four and beyond at a level far beyond what is ever expected in these new Massachusetts math standards.*

Here are some sample problems from the third-grade USSR text described above. Typically, even U.S. K–8 teachers find these problems extremely difficult to solve.[39]

561. Two airplanes left an airport at the same time and flew off in opposite directions. 10 min. after takeoff, the distance between them was 270 km. The first airplane flew at a speed of 15 km per minute. What was the speed of the second airplane?

563. A lesson lasted $\frac{3}{4}$ hr., and a recess $\frac{1}{6}$ hr. How many minutes do two lessons and two recesses last?

564. 2,400 liters of gasoline were delivered to a farm. On the first day, $\frac{3}{10}$ of all the gasoline was used, and on the second day $\frac{2}{10}$. How many liters of gasoline were used in these two days?

565. There are 3,600 workers at a factory; $\frac{3}{4}$ of all the workers are men, and the rest women. How many women are there at the factory?

We now list the totality of ratio, rate, percent, and proportion standards that occur in the new Massachusetts seventh-grade mathematics standards: 7.RP.1, 7.RP.2, and 7.RP.3. Once more they are entirely insufficient, and occur fully three years after they appear in the expectations for students in high-achieving countries.

Analyze proportional relationships and use them to solve real-world and mathematical problems.

1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units. For example, if a person walks 1⁄2 mile in each 1⁄4 hour, compute the unit rate as the complex fraction /1⁄4 miles per hour, equivalently 2 miles per hour.

2. Recognize and represent **proportional** relationships between quantities.

   a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table, or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.

   b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.

   c. Represent proportional relationships by equations. For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.

   d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.

3. **Use proportional relationships** to solve multi-step ratio, *rate*, and percent problems. Examples: simple interest, tax, markups and *discounts*, gratuities and commissions, fees, percent increase and decrease, percent error.

To give the reader an idea of the level of skill students in high-achieving countries are expected to attain, we now present a number of problems taken from a sixth-grade national examination in Japan from the mid-1980's. It is well worth the reader's time to attempt to solve these questions in the time indicated at the end of each one. Even a very high percentage of U.S. high-school math teachers find most of these questions extremely challenging.

Laura, Ellen and Kate went to the museum. Laura paid $15 for all of their transportation. Ellen paid $9 for their entrance fees. Kate spent $6 for their drinks and gave Laura $5. After Ellen gave some money to Kate, their expenses were equal.

How much money did Ellen give Kate?

Answer A = $1

Answer B = $3

Answer C = $4

Answer D = $6

Answer E = $7

Correct Answer = A

Max Time In Seconds = 180

There are 4 classes; A, B, C and D. The total number of people in classes A and B is 30. The average weight of A and B is 148. The average weight of C and D is 142. D class has 17 people. The average weight of all classes is 145.

How many students are in the C class?

Answer A = 10 students

Answer B = 13 students

Answer C = 17 students

Answer D = 19 students

Answer E = 20 students

Correct Answer = B

Max Time In Seconds = 240

The sum of Wayne's and his parent's ages is 80. The sum of his parents′ age is 9 times that of Wayne's. There is a 4 year difference between his father's and mother's ages. His father is older than his mother.

How old is his father?

Choices:

Answer A = 30 years old

Answer B = 34 years old

Answer C = 36 years old

Answer D = 38 years old

Answer E = 40 years old

Correct Answer = D

Max Time In Seconds = 180

	A	B
Normal price	$15	$10
Sale price	$12	$6

The prices for products A and B are shown in the diagram. When Dan sold 150 total products at the normal price, he received $1,925.

If he had sold these products at the sale price, how much would he have received? (The number of products A and B he could have sold remains the same.)

Choices:

Answer A = $1,290

Answer B = $1,320

Answer C = $1,410

Answer D = $1,560

Answer E = $1,620

Correct Answer = C

Max Time In Seconds = 180

When you buy 14 notebooks and 26 pencils, you pay $51.60. The price of a notebook is 20 cents less than that of 3 pencils.
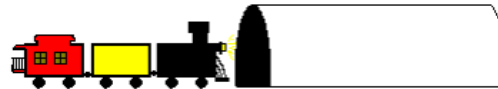
How much is a pencil?

Choices:

Answer A = $0.30

Answer B = $0.50

Answer C = $0.80

Answer D = $1.00

Answer E = $1.10

Correct Answer = C

Max Time In Seconds = 120

The train whose length is 200 meters entered a tunnel at 10:30 sharp. When the last car of the train came out of the tunnel it was 10:36 and 10 seconds. The length of the tunnel is 3500 meters.

How fast was the train traveling?

Choices:

Answer A = 10 meters/second

Answer B = 20 meters/second

Answer C = 30 meters/second

Answer D = 40 meters/second

Answer E = 50 meters/second

Correct Answer = A
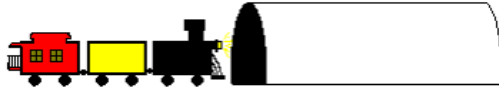
A train whose length is 150 meters took 30 seconds to go completely through a tunnel. Its speed was 60 km per hour.

How long is the tunnel?

Choices:

Answer A = 800 meters

Answer B = 750 meters

Answer C = 600 meters

Answer D = 550 meters

Answer E = 350 meters

Correct Answer = E

Max Time In Seconds = 120

Hose A can fill a pool in 4 hours and Hose B can fill a pool in 6 hours. Hose B was used first to fill the pool for 0.5 hours. Then, Hose A and Hose B were both used together for 1 hour.

After that, if only Hose A were used to fill the rest of the pool, how long would it take?

Choices:

Answer A = 0.6 hours

Answer B = 2 hours

Answer C = 2.7 hours

Answer D = 3 hours

Answer E = 3.4 hours

Correct Answer = B

Max Time In Seconds = 120

Mike took four tests; English, Math, Science, and History. He got a 74 in English, and an 84 in History. The average of the four tests was 72. Math was better than Science by a score of 6.

What was the Science score?

Choices:

Answer A = 56 points

Answer B = 62 points

Answer C = 58 points

Answer D = 60 points

Answer E = 54 points

Correct Answer = B

Max Time In Seconds = 180

Angelina, Sara and Gena have a specific amount of money. The sum of Angelina's and Sara's is $45, that of Sara's and Gena's is $60, and that of Gena's and Angelina's is $55.

How much money does Gena have?

Choices:

Answer A = $15

Answer B = $20

Answer C = $25

Answer D = $35

Answer E = $40

Correct Answer = D

Max Time In Seconds = 120

Steve and Larry had some money. The ratio of their amounts was 7:3. When Steve spent $22 and Larry received $7, the ratio of their amounts became 4:5.

How much did Steve have originally?

Choices:

Answer A = $18

Answer B = $25

Answer C = $30

Answer D = $4

Answer E = $53

Correct Answer = D

Max Time In Seconds = 180

The Nature of the Mathematics Addressed
in Grades Eight and Above

Rather than develop the level of skill and depth of understanding of these basic and essential concepts, as is done in high-achieving countries, in eighth grade and beyond, the new Massachusetts standards turn to a very formal and theoretical analysis of proportions to begin a low-level study of the rates of change occurring in very special families of functions. Here, it is remarkable that the authors never explain that they are introducing a general and very formal (hence, very obscure) discussion of the basic preliminaries to the advanced ideas that are key to topics like statistics and data analysis, linear algebra, and even calculus.

Of course, from the perspective of trying to prepare students for actually using these subjects, there is little doubt that this is the worst possible choice. We are already starting to hear ever

louder complaints from our two- and four-year colleges about their incoming students' preparation for college-level mathematics courses. These standards will not alleviate, and may exacerbate, that problem.

The related eighth-grade standards (8.EE):

Understand the connections between proportional relationships, lines, and linear equations.

5. **Graph proportional relationships**, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.

6. Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.

Here, 8.EE.5 and 8.EE.6 are unchanged from the corresponding standards in the original Common Core. 8.EE.5 focuses on an apparently unmotivated example to try to relate the slope of the linear equation of a proportion line to speed. But there is no discussion of "speed" before sixth grade, and there it is simply mentioned in a single comment in 6.RP.3 with no hint that in high-achieving countries the students literally do hundreds of speed-related problems starting in grades three or four.

But as questionable and obscure as 8.EE.5 is, 8.EE.6 is far worse. It was already necessary to distinguish between the mathematics that teachers need to know and what students need to learn in our discussion of the disastrous 1.OA.6. The same issue is present in 8.EE.6.

Teachers should know this proof, but how they use it with their students should be entirely up to them. Indeed, for most students, 8.EE.6 is apt to be very confusing.

The next eighth-grade standards describe how teachers are expected to teach functions. As was the case with 8.EE.6, we again see the focus on general properties rather than the properties of explicit, key functions such as linear functions ($x \rightarrow mx + b$), elementary quadratic ($x \rightarrow x^2$), square root, exponential ($x \rightarrow b^x$), and logarithmic ($x \rightarrow \ln_a(x)$), which would typically be done in any of the high-achieving countries:

Functions (8.F)
Define, evaluate, and compare functions.

1. Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.

2. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.

3. Interpret the equation $y = mx + b$ as defining a linear function whose graph is a straight line; give 2 examples of functions that are not linear. For example, the function $A = s$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1, 1),(2, 4) and (3, 9), which are not on a straight line.

Use functions to model relationships between quantities.

4. Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

5. Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

Standards 8.F.1 to 8.F.5 illustrate the perspective on mathematics that informs all the new Massachusetts math standards from eighth grade onwards. The intent is not to teach students how to use this core mathematics, but to give them superficial familiarity with the easier, formal aspects of the topics. From my perspective, this would tend to give the students a feeling that they know something about the further topics without enabling them to actually work in any area that uses them.

For comparison, at this point we record five of the easiest problems out of a much larger set of sample problems collected by a major USSR mathematician (V.I. Arnold) in 2004, which represent the expected level of problems a solid student there should have been able to solve by the end of seventh grade. The third of the five is much more subtle than it looks at first glance and is almost universally solved incorrectly by people in this country.

1. A brick weighs 1 pound and half the brick. How many pounds does the brick weigh?

2. Suppose we have a barrel of wine and a cup of tea. A teaspoon of wine is taken from the barrel and poured into the cup of tea. Then the same teaspoon of the mixture is taken from the cup and poured into the barrel. Now the barrel contains some tea and the cup contains some wine. Which volume is larger—that of the tea in the wine barrel or of the wine in the teacup?

3. The hypotenuse of a right triangle is 10 inches and the corresponding height of the triangle is 6 inches. Find the area of the triangle.

   [American school kids had successfully handled this problem for 10 years, coming up with the answer of 30 square inches. But then Russian kids arrived and none of them could get the same answer. Why?

   *Hint: Here, do not take the comment above literally. In fact, what he was really saying was that the American students **thought** they had done the problem correctly, but their answer was entirely incorrect!]*

4. The number of Basil's sisters is 2 more than the number of his brothers. How many more daughters than sons do Basil's parents have?

5. The distance between two towns, A and B, is 40 km. Two bicyclists leave A and B simultaneously and start moving towards each other. One moves with the average speed of 10 km/h, and the other 15 km/h. At the same time, a fly leaves A with the first bicyclist and flies towards B at a speed of 100 km/h. It reaches the second bicyclist, turns around and flies towards the first one; as soon as it reaches him, it turns around and flies to the second bicyclist. The fly keeps going in this fashion until the two bicyclists meet. What is the total distance covered by the fly?

Conclusions

Overall, our analysis of the 2017 English Language Arts revision shows four things:

- Absence of philology (and therefore of phonetics, lexicology and references to historical events)

- A lack of English and world literary history

- A displacement of important civic-literary historical writings

These three deficiencies might be summarized as the result of a broad assumption that we must not identify some works and cultures as better than others. We can't help doing so, of course, as the list of works in Appendix B proves. But we can minimize our discrimination by making the lists very large and withholding any explicit references to individual works and cultures in the standards themselves. The multiculturalist commitment demands that we do so.

This brings us to the fourth and final problem with the standards, one underlying all the others. It is precisely the denial of one of the prime instructions that English used to claim, namely, the recognition of the great, the good, and the mediocre. Formerly, students in English learned to identify and explain superior literary creations. They analyzed them, yes, but they also imparted their superiority. A good English student read widely in the classics and acquired a taste for brilliance and

beauty in language. This is one of the outcomes of studying the Western canon: developing a taste for greatness.

If you majored in English in college, you marked yourself as a discerning reader and astute critic. You might enjoy genre fiction such as mass-market detective stories, but you understood well the difference between them and *The Trial* and *Crime and Punishment*. This critical sensibility developed precisely through exposure to the better examples. By reading Jane Austen and the Brontes, you improved your sense of what is genuine and what is phony or distorted in matters of love (and in novels about love). The curriculum was to produce young people with improved taste.

We see no evidence of this ambition in the revised Massachusetts standards. When it comes to literature, the goal is to comprehend and analyze, not evaluate. Arguments may be assessed on logical and empirical grounds, but aesthetic discriminations are absent. The reason, we suspect, lies in the multiculturalist goals of the new revision. Once people start comparing works, judging some artistically, intellectually, and/or morally superior to others, the open-minded relativism that goes with diversity-sensitivity may wither. Instead of being inclusive of all cultures, they may grow exclusive and proprietary, believing, for instance, that nothing in Caribbean literature approaches the Modernist fiction they love.

But in ignoring the cultivation of taste, the authors of the *Framework* overlook one of the things that make English a distinctive, impressive discipline. The capacity to rank human creations on different grounds is essential to what the ancients called *humanitas*, the sum of those traits that make us more than creatures of appetite and power. A healthy society claims many individuals of advanced *humanitas*, and not to tell all youths that they can aspire to refined judgment and critical sensibility and companionship with the best that has been thought and said is a pedagogical crime.

Our analysis of the 2017 mathematics revision shows three things:

- By eighth grade the new Massachusetts math standards are at least three full years behind actual expectations in countries such as Korea, China, Japan, Singapore, and the other highest-achieving countries in the world in the most important mathematics the students are expected to learn. Further, if these standards continue to be faithfully followed for the rest of these students' K–12 experience, the students will be even more than three years behind.

- People might try to argue that what matters is what students following these new Massachusetts standards are learning, and they learn the material better by proceeding slowly. However, when considering the actual problems students in high-achieving countries routinely solve, even restricted to just those in the two key areas this analysis focuses on (first, arithmetic and second, ratios, rates, percents, and

proportions), not only U.S. students but most U.S. teachers have great difficulties with these standard problems.

- Moreover, when one notes the areas and levels covered by these problems, it turns out that they are exactly what is needed to prepare students for the more advanced mathematics needed in STEM (science, technology, engineering, and math), medicine, nursing, finance, and more generally, all areas that use any mathematics beyond just routine arithmetic.

As mentioned, there are already loud complaints from the mathematics faculties at our two- and four-year colleges and universities about the preparation of their incoming students in mathematics. In the key areas studied here, the new standards are essentially unchanged from the Common Core standards Massachusetts has been using for at least the last five years and that have contributed to these problems in college preparation. So it is highly unlikely there will be any improvement in these miserable outcomes with the new mathematics standards. They need to be completely redone.

Endnotes

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7. *Id.* See also Archived Information, National Math Panel (March 2008), *available at* https://www2.ed.gov/about/bdscomm/list/mathpanel/report/factsheet.pdf.

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9. *Id.*

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14. See https://www.gatesfoundation.org/How-We-Work/Quick-Links/Grants-Database#q/k=fordham%20institute.

15. *The State of State Standards, supra* n. 6.

16. Andre Mayer, "Massachusetts Wins $250 Million to Improve Public Schools," *aimblog* (Aug. 24, 2010), *available at* http://blog.aimnet.org/AIM-IssueConnect/bid/45461/Massachusetts-Wins-250-Million-to-Improve-Public-Schools.

17. Mark McQuillan, Richard P. Phelps, & Sandra Stotsky, *How PARCC's False Rigor Stunts the Academic Growth of All Students*, Pioneer Institute, No. 135 (Oct. 2015), p. 5, *available at* http://pioneerinstitute.org/news/testing-the-tests-why-mcas-is-better-than-parcc/.

18. *Id.*

19. *Id.* at p. 5.

20. *See* http://www.doe.mass.edu/bese/docs/fy2016/2015-09/spec-item1.html.

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24. *See* http://profiles.doe.mass.edu/staterc/naep.aspx?fyCode=2013 (2013 NAEP scores); https://www.nationsreportcard.gov/profiles/stateprofile?chort=2&sub=MAT&sj=AL&sfj=NP&st=MN&year=2015R3 (2015 NAEP scores).

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26. *See* http://www.doe.mass.edu/frameworks/ela/2017-06.pdf#search=%22framework english language arts%22; http://www.doe.mass.edu/frameworks/math/2017-06.pdf#search=%22framework mathematics%22.

27. See http://www.doe.mass.edu/frameworks/ela/2017-06.pdf.

28. Mark Bauerlein & Sandra Stotsky, *How Common Core's ELA Standards Place College Readiness at Risk*, Pioneer Institute, No. 89 (Sept. 2012).

29. In mathematics, Massachusetts eighth-graders tied for fifth place in achievement (average score of 561), trailing only the four highest-performing Asian countries... Massachusetts students scored significantly higher in mathematics when compared to their peers in the United States as a whole. https://nces.ed.gov/timss/pdf/results11_Massachusetts_Math.pdf

30. For details, see the discussion of the mathematics results in http://www.doe.mass.edu/news/news.aspx?id=24050.

31. In this article the high-achieving countries are considered to be China, Japan, Singapore, South Korea and, to a lesser degree, India and Russia. China needs some caveats as not all regions perform at this top level due to its vast population. The dominant areas are Beijing, Hong Kong, and Shanghai. At various times other countries such as Israel were also part of this elite group.

32. When the great mathematician Kunihiko Kodaira left Stanford and returned to Japan in 1969, he helped create new K–12 mathematics standards for Japanese schools and authored the texts used. The resulting program remained in use with relatively minor changes until about 1999. I learned a great deal of the history of that time from conversations with Professors Paul Cohen and David Gilbarg in the Department of Mathematics at Stanford, as well as conversations both at Stanford and in Japan with a number of Japanese mathematicians.

33. The old USSR program was developed under the guidance of the leading USSR mathematician of the 20th century, Professor Andry

Nikolaevich Kolmogorov and, to this day, it underlies the Russian K–12 mathematics program and those in most of the other countries in the former USSR, such as Hungary, Poland, and Romania. Among other top mathematicians involved in the development of this program were Professors V. I. Arnold, Marina Ratner, and Alexander Givental. I learned a great deal of the history there from conversations with Professors Arnold, Ratner, and especially Professor of Mathematics Education, Regina Panasuk at the University of Massachusetts-Lowell.

34. For example, Israel adopted the USSR program in mathematics in 1948 and used it until the early 1970's; China adopted the USSR program in 1955 and added to it a very important course on algorithms, data analysis, and statistics that beautifully presents the most important new mathematics of the 20th century. Singapore adopted the Chinese program in 1984. The details of these various parts of the history were given to me by, among others, Professor Yatzhak Katznelson in the Department of Mathematics at Stanford, Prof. H.-H. Wu at the University of California, Berkeley, and mathematics educators from China and Singapore.

35. Draft Chinese Math Standards, 2003. (Available from Professor Milgram on request.)

36. See S. Colbert's 2014 discussion, a part of which can be found at http://www.cc.com/video-clips/nemi1a/the-colbert-report-common-core-confusion, for more details.

37. It is difficult to find later examples of the Russian texts to use for illustrations, as they have not been translated into English and the translations published yet. However, the problems above are either identical to problems in their current texts or entirely equivalent to them. What these examples show is the expected *level of student achievement* there.

38. In 6.RP.3 the new material is, as stated, either nonsense or has a hidden assumption that the density is constant. Hidden assumptions are extremely problematic in mathematics.

39. As before, these or equivalent problems are found in the current programs in high-achieving countries. However, typically, these more recent programs have not been translated (the exception is the Japanese program based on U.S. mathematics, that was used during the early 2000's but later rejected by the Japanese government). Thus, we use examples from the USSR books used during the 1980's.

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Jane Robbins is an attorney and a senior fellow with the American Principles Project (APP). With Emmett McGroarty she co-authored the APP/Pioneer Institute report, *Controlling Education From the Top: Why Common Core Is Bad for America*. She has published numerous articles about the problems with Common Core, including those of intrusive data collection and threats to student privacy, and has testified about these issues before the legislatures of 12 states. She is a graduate of Clemson University and the Harvard Law School.

About Pioneer

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