National Cost of Aligning States and Localities to the Common Core Standards

*A Pioneer Institute and
American Principles Project White Paper*

by AccountabilityWorks

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This paper is a publication of the Center for School Reform, which seeks to increase the education options available to parents and students, drive system-wide reform, and ensure accountability in public education. The Center's work builds on Pioneer's legacy as a recognized leader in the charter public school movement, and as a champion of greater academic rigor in Massachusetts' elementary and secondary schools. Current initiatives promote *choice and competition, school-based management, and enhanced academic performance in public schools.*

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AccountabilityWorks

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Executive Summary

- All but five (5) states have committed to adopting the Common Core State Standards (CCSS) in English language arts and mathematics and are participating in one of the federally-sponsored consortia developing aligned assessments (see Figure 1). Few of the participants, however, have carefully analyzed the costs involved.

- Significant new costs are projected in three key areas of standards-based reform: assessment, professional development, and textbooks and instructional materials. In addition, states and local communities are expected to face substantial new expenditures for technology infrastructure and support.

- Over a typical standards time horizon of seven (7) years, we project Common Core implementation costs will total approximately $15.8 billion across participating states. This constitutes a "mid-range" estimate that only addresses the basic expenditures required for implementation of the new standards. It does not include the cost of additional expensive or controversial reforms that are sometimes recommended to help students meet high standards, such as performance-based compensation or reduced class sizes.

- Total, seven-year costs include the following additional expenses: $1.2 billion for the new assessments, $5.3

Figure 1. Common Core States Participating in PARCC only, SBAC only, or both PARCC & SBAC
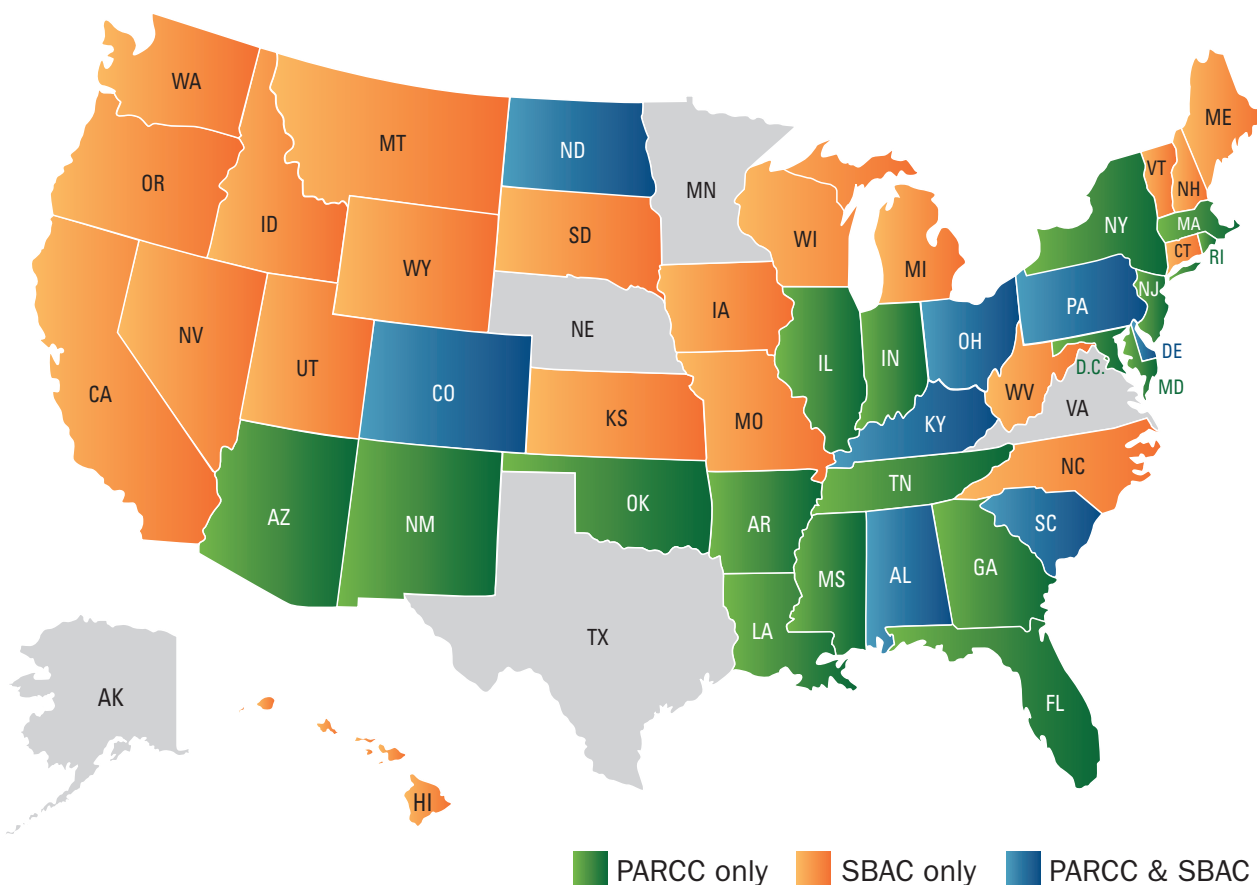
billion for professional development, $2.5 billion for textbooks and instructional materials, and $6.9 billion for technology infrastructure and support (see Figure 2A).

• $10.5 billion of the projected amount is for "one-time" costs that include familiarizing educators with the new standards

obtaining aligned textbooks and instructional materials, and sufficiently enhancing technology infrastructure to implement the Common Core online assessments for all students. (See Figure 2B)

• First year operational costs are projected to be approximately $503 million higher,

Figure 2A. T...... to Implement Com...... llions)

Textbooks & Instructional Materials $2.

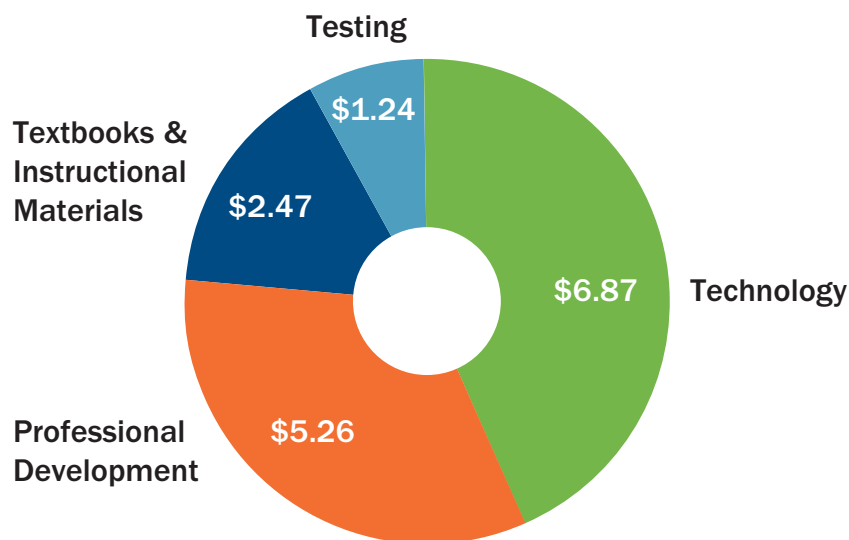$6.87 Technology

$5.26

Professional Development

Figure 2B. Overview of Projected Costs to Implement Common Core

	One Time	Year 1 Operations	Years 2-7 Ongoing Operations (Annual)	Total of One Time & 7 Operational Years
Testing Costs	$0	$177,234,471	$177,234,471	$1,240,641,297
Professional Development	$5,257,492,417	$0	$0	$5,257,492,417
Textbooks & Instructional Materials	$2,469,098,464	$0	$0	$2,469,098,464
Technology	$2,796,294,147	$326,042,312	$624,258,785	$6,867,889,169
TOTAL	$10,522,885,028	$503,276,783	$801,493,256	$15,835,121,347

including increased assessment expense for some states as well as technology training and support.

• In years two and beyond, annual operational costs are projected to be $801 million higher, including increased assessment expense for some states and the ongoing cost of supporting the enhanced technology infrastructure required for online assessment.

• There is considerable uncertainty regarding future student testing costs. The two testing consortia, especially the Smarter Balanced Assessment Consortium (SBAC), also face considerable technical challenges to accomplish their goals.

• California, a state with highly rated academic standards and a challenging fiscal climate, illustrates some tough tradeoffs. The state, a member of the SBAC, is projected to incur significantly higher state assessment costs of approximately $35 million each year.

• States and communities should avoid trying to implement the Common Core, or any set of new standards, "on the cheap." Inadequate training, instructional materials, or necessary infrastructure can lead to teachers and administrators disclaiming responsibility for failure because they did not receive adequate support.

Introduction

Federal policies to support state standards-based reform in education were first authorized by Congress in 1994 under the Goals 2000: Educate America Act, which also established a target of American students becoming first in the world in mathematics and science achievement by the year 2000. Many of the elements of Goals 2000 were later incorporated into the Elementary and Secondary Education Act (ESEA), which linked federal Title I funds, on which most school districts are dependent, to federal requirements for standards-driven reform. Though the mathematics and science achievement target was not met, in 2001 the Congress passed the No Child Left Behind Act (NCLB) with wide bipartisan support, extending and elaborating prior requirements for standards-based reform. Among the new federal requirements was that states establish uniform policies to ensure that schools achieve Adequate Yearly Progress (AYP). AYP required that all schools annually increase the proportion of students meeting state-established academic standards up to 100 percent by the spring of 2014.

Though the federal formula for AYP was prescriptive, NCLB allowed states to establish their own academic standards and develop their own student assessments to measure progress. Since the passage of NCLB, critics highlighted the widely varying quality and rigor of state standards.[1] For example, some states report improvement in student performance based on their state standards, yet on a national measure, the National Assessment of Educational Progress (NAEP), those same states do poorly.[2] Though many states have shown substantial progress on their state assessment, overall improvement on the independent NAEP assessment has been more limited. Further, an increasing percentage of schools are failing to meet the federal AYP formula.

In response, the United States Department of Education under the Obama Administration, working with most states, has called for the implementation of a national set of "common core" standards. Two organizations in Washington, D.C., the National Governors Association Center for Best Practices (NGA Center) and the Council of Chief State School Officers (CCSSO) led the effort to develop the Common Core State Standards Initiative (CCSSI).

Ze'ev Wurman and Sandra Stotsky questioned the academic rigor, as well as a perceived lack of transparency and the accelerated nature of the development process.

Proponents argue that, "Consistent standards will provide appropriate benchmarks for all students, regardless of where they live."[3] Yet, the development of the Common Core has not been without critics. Pioneer Institute retained experts with knowledge of the subject matter to develop a series of white papers that provided specific recommendations for improvement and, ultimately, questioned whether states with highly regarded standards (e.g., Massachusetts and California) would benefit from replacing their current standards with the new Common Core standards.[4] Ze'ev Wurman and Sandra Stotsky questioned the academic rigor, as well as a perceived lack of transparency and the accelerated nature of the development process, charging that it didn't permit sufficient time for public or other expert review and comment.[5]

Despite these questions, federal stimulus-supported grants called Race to the Top (RTT) created a powerful incentive for cash-strapped states to adopt the Common Core standards, with many doing so before the standards were completed in June 2010.[6] To institutionalize the effort for the long term, and perhaps help push the handful of remaining state holdouts to come aboard, federal officials have since proposed requiring states to adopt the new Common Core standards (or other federally-approved "college and career readiness" standards) to continue to receive Title I funds, on which most districts are financially dependent. States seeking federal waivers, such as from the sanctions included in NCLB for failing to meet federal AYP requirements, have been told that such will only be granted if they adopt the Common Core.

> [A]ny new proposal should be considered in light of its costs as well as its benefits.

To replace current state assessments with uniform national assessments, the United States Department of Education supported the creation of two assessment consortia to develop tests that measure the Common Core standards. The Department awarded federal stimulus funds to two consortia of states, each managed by a nonprofit entity: 1) the SMARTER Balanced Assessment Consortium (SBAC) and 2) the Partnership for the Assessment of Readiness for College and Careers (PARCC).

It is an axiom of sound public policy that any new proposal should be considered in light of its costs as well as its benefits. Historically, states have had to make considerable financial investments each time they have modified or

adopted academic standards to realign their testing, textbooks and classroom instruction. As of this writing, 45 states and Washington, D.C. have agreed to adopt the Common Core standards.[7] However, few of the states that have adopted the Common Core standards have attempted to analyze and project any of the significant costs that will be required to properly implement the new standards. In fact, as of this writing, none of the states that have adopted Common Core have released a cost or feasibility analysis of the technology infrastructure and support necessary to administer either of the testing consortia's online assessments.

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It is the purpose of this study to stimulate an informed policy dialogue about the likely costs of implementing the Common Core standards. The nationwide calculations are intended to encourage similar, more detailed efforts in individual states that take into account additional local considerations. The methodology followed in this analysis aims for a mid-range projection of costs, neither overly optimistic nor unduly pessimistic. It relies on assumptions reflecting the years of experience states have now accumulated in implementing academic standards. No doubt, different cost studies by different analysts will come to somewhat different conclusions. But given the lack of attention to these issues to date, we would be satisfied by the very existence of serious public debate.

Methodology

The goal of this analysis was to develop a "middle of the road" estimate of the "incremental" (i.e., additional) cost of implementing the Common Core standards based, as much as possible, on actual state or local experience implementing similar initiatives. We sought to avoid the inclusion of assumptions for any expenses that might be criticized as lavish, while also attempting to avoid unsupported optimism that new or untested approaches will lead to radically lower expenditures. While it's possible that either the former or the latter might turn out to be applicable to some states and communities, neither provides a prudent basis for projecting overall, nationwide costs.

The past two decades of state standards-based reform have resulted in a general consensus that assessment, professional development and instructional materials are essential elements to align with new academic standards and each may reflect substantial costs.

The analysis focuses on areas where there is broad consensus among analysts, either that a particular area is a vital component of standards-based system reform or that it is one for which substantial additional costs are likely to be necessary. The past two decades of state standards-based reform have resulted in a general consensus that assessment, professional development and instructional materials are essential elements to align with new academic standards and each may reflect substantial costs.[8] In these areas, the analysis relied as much as possible on assumptions drawn from experience-based cost estimates by state or local school officials. In cases without a clear reason to prefer one cost assumption to another, the typical divergence between sources was addressed by averaging them; in some instances, these were weighted proportionately in favor of sources based on a larger student population (e.g., a source based on a larger state weighted more heavily than a source based on a smaller state). The other major element addressed in this analysis—technology infrastructure and support—is increasingly recognized by both supporters and critics of Common Core as an area that will require significant new investments given the exclusively online nature of planned Common Core assessments. All student enrollment or teacher population data used in calculations were drawn from nationally comparable tabulations by the National Center for Education Statistics (NCES).[9]

The other major element addressed in this analysis—technology infrastructure and support—is increasingly recognized by both supporters and critics of Common Core as an area that will require significant new investments given the exclusively online nature of planned Common Core assessments.

Notably, this analysis does not address costs in areas where state and local practices and history vary too widely. For example, in recent decades standards implementation in California has involved expenditure on a broad, public process that includes the development of state curriculum frameworks in each subject area as well as adoption of textbooks and other instructional materials. On the other hand, some states do not have a textbook adoption process at all and do not develop state curriculum frameworks to guide the implementation of state standards. Other states perform only some of these tasks

or do so on a very small scale with limited cost. Without expressing judgment on the wisdom or value of such practices, they are not included as costs in this analysis because they do not reflect a consensus among states that they are essential to standards implementation.

States adopting the Common Core standards reserve the right to add up to 15 percent academic content to reflect additional knowledge or skills that they wish their students to know or be able to do. States are likely to vary widely in the extent to which they take advantage of this flexibility since it involves spending additional funds, such as to develop additional assessments to measure whether students are mastering the added 15 percent of content. In any case, such optional activity is not required to implement the Common Core standards themselves and therefore would be in addition to the items included as part of this cost analysis.

In a sense, this study identifies only the "basic" costs of implementing the Common Core standards, not all possible costs associated with raising student achievement to much higher levels.

Another category of costs excluded from this study are the broad range of reforms designed to assist students in actually meeting the Common Core standards. This may at first appear to be a glaring omission. In fact, there exist fundamental disagreements among reform experts regarding the type of reforms that are necessary to achieve this goal. Some proposed reforms, such as expansion of early childhood education or reduced class sizes, are quite expensive. Other proposed reforms, such as revising teacher tenure policies or expansion of charter schools, are generally far less expensive. Further, even in areas of increasing consensus among reformers, such as increased compensation for higher performance, there are still disputes over whether such initiatives should be supported through increased overall funding or through the reallocation of existing funds.[10] Attempting to identify costs in this area would unavoidably involve myriad questionable assumptions that would only be persuasive to those who already agree with the particular school reform vision they represent. Such an effort is beyond the scope of this study. In a sense, this study identifies only the "basic" costs of implementing the Common Core standards, not all possible costs associated with raising student achievement to much higher levels.

This study relies on two additional assumptions: first, states and districts that have committed to the Common Core standards are serious and plan to invest the resources necessary for a solid implementation; second, the two Common Core assessment consortia will be successful in developing their assessments within the cost parameters they have outlined. There are reasons for doubt about the second assumption—including ambitious goals, cursory planning, and major design shifts—but, until demonstrated otherwise, the analysis must assume that they will adjust their plans as needed in order meet their cost targets.

All costs included in this analysis are divided into three categories:

- One-time costs;
- Year one operational costs;
- Ongoing annual operational costs for years 2 through 7.

One-time costs—including teacher professional development, aligned textbooks and the technology infrastructure required for online assessment—are for activities that must be in place prior to meaningful implementation of Common Core instruction or assessment. Ideally, all such activities will be implemented before school year 2014-2015, the first year in which students are to be assessed on their mastery of the new standards. Some "one-time" activities could be spread out over several years prior to 2014-2015. For example, the Washington Department of Public Instruction's analysis of local district costs assumes professional development for educators and administrators over multiple years; 25 percent of educators are expected to receive professional development in 2012-2013, 50 percent in 2012-14, and the remaining 25 percent in 2014-2015. Since states will vary considerably in their year-by-year rollout plans, we combine all such one-time costs into a single category and do not attempt to assign them to particular years.

Year one operational costs are distinguished from ongoing annual operational costs for subsequent years. The first operating year includes administration of Common Core online assessments as well as costs for technology training. An annual 20 percent replacement cycle for the added computer infrastructure is not projected until beginning in the second year of operations. A total of seven years of operating expenses are included in the cost analysis, a typical amount of time in between academic standards revision cycles in many states (i.e., a revision cycle triggers new one-time costs for realignment).

Finally, while there is a constant flow of new and potentially relevant data related to a study on such a fast-moving topic, any analysis must at some point stop collecting new information. Information relevant or useful to this analysis was collected through November 15, 2011. Material that emerged after that date is unlikely to have been considered in developing this report.

Testing

Measuring student progress in meeting the Common Core standards requires assessments aligned to the new standards. The United States Department of Education awarded sizable grants to two parallel efforts to create such assessments. A total of $362 million was awarded: $186 million was awarded to states working with Achieve, Inc., in the Partnership for Assessment of Readiness for College and Careers consortium, while $176 million was awarded to states working with the SMARTER Balanced Assessment Consortium. Both efforts promise a new generation of breakthrough, online assessments that will place a greater emphasis on innovative test questions and student higher order thinking skills.[11]

> We project that the annual cost of assessment for states participating in the consortia will increase by a total of $177.2 million each year.

We project that the annual cost of assessment for states participating in the consortia will increase by a total of $177.2 million each year (see Figure 3). These are not one-time costs (which are covered by the federal grants to the consortia), but ongoing operational costs that will be faced each year. Over the seven-year horizon of this cost analysis, the total increase would be over $1.2 billion.

Figure 3. Additional Annual Testing Costs (Millions)

PARCC/SBAC States

$20.46

$157.84

PARCC States
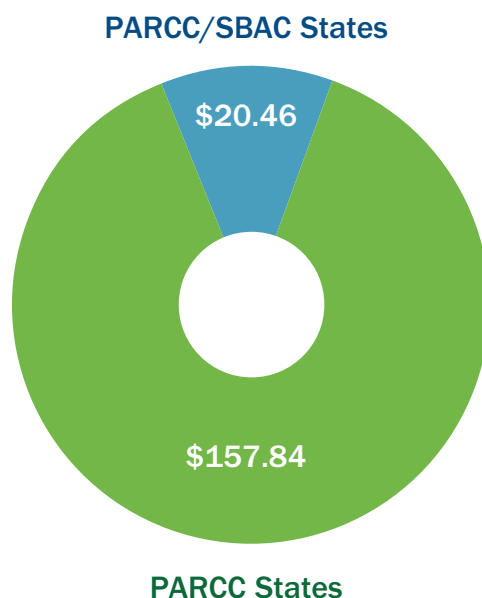
We caution that, lacking any alternative, these figures are based on acceptance of the cost targets for the two consortia largely at face value. The goals and plans of the two consortia are ambitious, both with respect to innovative design as well as an assumption that all participating states will shift to online assessment. If either of these proves too challenging, the consortia could be faced with difficult choices that require significantly higher costs, greatly simplified assessments, or both. In our judgment, such tough choices are likely. Additional discussion of operational challenges related to the plans by the consortia for online testing is included below.

Discussion and Assumptions

One area in which both consortia intend to change the face of assessment is computer-based scoring of open response test questions. Unlike multiple-choice test questions that are easily and reliably scored by computer-based systems, open response questions, such as short answer, essay or even extended projects have historically been scored by trained human raters with relevant expertise

and qualifications. PARCC and SBAC share a goal of greater reliance on open response test questions and reduced reliance on multiple-choice test questions. At the same time, both indicate that their projected costs assume that a majority of open response test questions will rely solely on computer-based "artificial intelligence" scoring algorithms without the involvement of a human rater. Instead, only a sample of student answers to open response test questions is expected to be scored by human raters and statistical analyses are planned to determine whether there is adequate agreement between expert human raters and the computer-generated scores.

Computer-based scoring of open response test questions is not a completely new idea, having evolved gradually from experimentation to live administration in schools over the last two decades. However, current plans for the Common Core assessments contain two elements that would be quite new. First, the extent of exclusively computer-based scoring has previously been relatively limited. Second, exclusively computer-scored test

questions have not been used on a large scale on high-stakes assessments.

Computer-based scoring of open response test questions is not a completely new idea, having evolved gradually from experimentation to live administration in schools over the last two decades.

Until recently, stakes for most state-mandated assessments were limited to public disclosure of annual results, aggregated at the school, district and state levels. A limited number of states also require students to pass a designated graduation test and, in fewer cases, use state assessment data in decisions on student grade promotion. Graduation or promotion assessments are truly "high stakes" testing environments; states incorporating such elements in their assessment program have tended to be fairly conservative in the design and operation of these assessments, using mostly proven designs and methodologies that can withstand legal challenge (which are not uncommon). Under the Obama Administration, the United States Department of Education has strongly encouraged states and school districts to ratchet up the stakes for large-scale assessments by using results for the evaluation of teachers. For example, to receive Race to the Top funding states needed to provide assurances that teachers and principals would be evaluated using student performance results.[12] As of June 2011, twelve states had received RTT funds.[13] Other groups, states, and districts are experimenting with teacher evaluation systems that use student test scores as a measure of teacher effectiveness.[14] Given the substantial protections for public school teachers established in many state statutes as

well as local collective bargaining agreements, significant legal challenges appear likely for tests that include exclusively computer-scored open response questions to evaluate teachers and determine either bonuses or negative consequences for nonperformance.

Under the Obama Administration, the United States Department of Education has strongly encouraged states and school districts to ratchet up the stakes for large-scale assessments by using results for the evaluation of teachers.

The per student testing cost assumptions used in this cost study rely in good part on the official assumptions included in the approved grant applications of the two Common Core consortia (updated in some cases based on direct communications with each consortium). Reliable, current per student testing costs for all U.S. states are unavailable; as a useful approximation, this analysis relies on a "typical" per student state testing cost of $19.93, an amount recently calculated by a group of testing industry experts.[15] This amount is credible and broadly consistent with the testing industry experience of the contributors to this study. While this figure is very useful for generating nationwide projections, it cannot be used to analyze testing costs for any particular state because individual state costs are highly variable; the largest states (e.g., California) typically spend less per student and states with fewer students tend to spend more.

SBAC

In its grant application to the United States Department of Education, the SBAC consortium identifies per student costs of $19.81 for the summative assessments

(required under federal law) and $7.50 for optional benchmark assessments. Since the benchmark assessments are not mandatory, we do not include their cost in this analysis, even though these assessments are probably an appealing component to many of the states in the SBAC consortium. Notably, the SBAC cost estimates were developed by the same group of testing experts that calculated the "typical" state per student cost of $19.93 (see above); perhaps not coincidentally, the projected SBAC assessment cost is only pennies apart from the current "typical" state cost. Lacking a sound basis for alternative SBAC cost projections, we adopt SBAC's official figures in our estimates; however, we are skeptical that these are likely to be accurate given SBAC's ambitious goals for innovative assessment design.

[T]he PARCC assessment consortium projected ongoing costs that ranged widely between $17 and $50 per student.

PARCC

The PARCC assessment design described in its grant application assumed four separate student assessments to be spread out over the course of the academic year with their results combined to produce overall, summative scores. In 2011, PARCC made fundamental changes to this design, replacing it with a plan to offer just two assessment components—both to be administered near the end of the school year—whose results would be combined to provide overall summative scores. Under the new plan, one of the assessment components is expected to be entirely computer-based while the other will focus on extended performance tasks. PARCC now also intends to offer additional, optional diagnostic and formative assessments.

In its grant application, the PARCC assessment consortium projected ongoing costs that ranged widely between $17 and $50 per student, depending on future decisions by the consortium regarding human versus computer-based scoring of open response test questions. The particular scoring approach described in detail in the application resulted in a cost of $32.68 per student, near the middle of its cost range.[16] As a result of a complete reworking of its assessment plans after its application was approved, PARCC now expects its per student costs to be somewhat lower, though it is not yet ready to commit to a particular figure.[17] For the purpose of this analysis, we accept that PARCC will find a way to achieve its intent of lowering costs below the $32.68 figure; we adopt as a reasonable estimate the midpoint between that previous figure and $17, the lowest end of the cost range included in the application, resulting in an assumption of $24.84 per student cost. However, given the considerable design changes so far, as well as the continuing lack of a commitment to a specific cost figure, we caution that there is a reasonable likelihood that either the final cost will be higher or that additional assessment design changes may be necessary in order to control costs.

States in both PARCC and SBAC

As of this writing, eight states are participating in both consortia and may end up choosing to implement either of the two assessment systems. For the purpose of estimating testing costs for these states, we assume that an equal proportion of the students in these states will end up in each of the two systems (i.e., effectively averaging the costs).

Other Operational Challenges

While online testing offers the promise of multiple benefits—such as faster scoring and no printing costs—state leaders with experience implementing online testing identify four significant operational hurdles:

1. Technology Infrastructure. Infrastructure-related challenges include: sufficient and secure bandwidth; the number of computers in a school available for testing; the location and set-up of school computers; and the age and reliability of equipment.[18]

2. District expertise and support. "'Few people understand how really challenging it is at the local level,' said one assessment director."[19]

3. Open Response test items. "One assessment leader who had difficulties scaling up online testing using constructed-response items said that he had observed similar problems in other states: "Everyone I've met who says 'Yes [statewide online testing] works like a charm, answers 'no' when I ask if their tests include constructed response."[20]

4. Lengthened Testing Window. An increased period of time for districts to complete testing is sometimes necessary to accommodate limitations of the technology infrastructure. Expanding the testing window, however, increases test security challenges because there are more students taking the same test on different days that may talk and share information.[21]

Implementation plans by the PARCC and SBAC consortia appear to be at odds with the "lessons learned" from previous experiences with online testing in several key respects.

One lesson is "Start Simple: Begin with multiple choice test items before venturing on to more complex items or open-ended assessments like writing."[22] Yet both testing consortia tout groundbreaking, innovative open-ended items as a key feature of their online assessments. Current plans call for these items to be incorporated from the beginning, not phased in over time.

Implementation plans by the PARCC and SBAC consortia appear to be at odds with the "lessons learned" from previous experiences with online testing in several key respects.

Another lesson is "Start Small: Stagger implementation of online assessments—gradually adding more subjects and grade levels—as districts and schools build their infrastructure and gain local expertise."[23] However, staggering implementation typically raises test development and scoring costs as well as technical hurdles because dual-testing systems must be created and operated. Psychometric equating to ensure comparability of paper and online assessment during the transition, for example, also adds significant work and expense. The current PARCC consortium plan to implement online testing fully in all subjects and grades in the first testing year (2014-2015) promises a reduction in costs and increased simplicity for the consortium. However, the lack of "phase-in" increases the challenge for local schools and districts, which must ramp up technology infrastructure and staff capacity relatively quickly. As far as we could find, none of the states participating in either of the two Common Core testing consortia conducted a rigorous feasibility assessment on implementing online assessment.

The SBAC consortium currently plans to offer states the option of using a paper and pencil version of its tests for the first three years of operation as a "transition period." While this allows school systems to delay for a few years the technology and support costs of implementing online testing, it presents the consortium with the costs and technical challenges of managing a dual paper and online system. For example, a tension will exist between ensuring comparability of the two assessments—an essential requirement—and the interest in "innovative" online test items that rely on technology for administration.

A twelve-week testing window would mean that some students would be tested nearly three (3) months earlier than other students.

To help local systems struggling with the technology and support costs associated with implementing online assessment, SBAC also currently plans to allow schools a twelve (12) week testing window in which to administer its online assessment.[24] However, if carried out, this would raise serious concerns regarding the validity of the SBAC assessment and key uses of the results. For test security reasons, most states currently do not permit schools more than one or two weeks to administer state accountability assessments and some even require administration in a single day. It may be possible to partially address security concerns through such elements as development of a large (expensive) item bank and computer adaptive testing.

But other, more fundamental, issues would remain. A twelve-week testing window would mean that some students would be tested nearly three (3) months earlier than other students. This represents nearly a third of a school year, indicating a fairly large difference between students in the amount of instruction received prior to testing; aggregation and interpretation of different student results generated across such a wide span of time raises serious questions. For example, if students cycle through computer labs for testing with their classroom group (a typical scenario), teachers with students assessed near the beginning of the testing window would be substantially disadvantaged compared to teachers with students assessed near the end of the testing window; under such circumstances, it would be unworkable to use student test results as a component of teacher evaluations, a policy encouraged by the Obama Administration.

Even at the school and district levels,... differences in technology infrastructure combined with a twelve week testing window would lead to some schools and systems benefiting from an average of nearly one and a half (1.5) extra months of instruction prior to testing compared to other schools and systems.

Even at the school and district levels, fundamental units of accountability in most states, differences in technology infrastructure combined with a twelve week testing window would lead to some schools and systems benefiting from an average of nearly one and a half (1.5) extra months of instruction prior to testing compared to other schools and systems. If differences in school technology infrastructure were associated with the relative affluence of the surrounding communities—which seems highly likely—the SBAC approach could

introduce a systemic distortion in assessment results in favor of wealthier schools; notably, this particular effect would not be an accurate reflection student skill differences, but would be an artifact of the assessment system itself.

Professional Development

Professional development for teachers on new academic standards is widely accepted as essential for implementation. Marshall Smith and Jennifer O'Day's seminal work on "Systemic School Reform" identified professional development as one of the key elements required to produce coherent, system-wide change in public school systems.[25] Since the experience of California and its curriculum frameworks in the 1980s, school reform leaders have advocated on behalf of systematic and in-depth professional development addressing state academic standards.[26] Common Core advocates indicate that ongoing, job-embedded professional development is a necessary component for the implementation of CCSS.[27] A sense of urgency for developing and implementing professional development programs was highlighted in a recent report by the Center on Education Policy, which surveyed 315 districts and found that less than half provided professional development for Common Core, nor did they plan to provide programs in the next school year.[28] Districts indicated that lack of funding and clarity from the State were the two biggest obstacles.[29]

We project a total cost for professional development of approximately $5.26 billion across the states that have adopted the Common Core standards. This is a "one-time" cost for experienced educators that must occur before students are held accountable for meeting the standards. The professional development need not occur in a single year; states may choose to "phase in" the professional development over a defined time span, reaching a certain proportion of the teacher population each year. We also assume that teacher education programs will take responsibility, without the necessity of additional funding, for reorienting their focus to prepare future teachers to implement the Common Core standards. Figures 4A, 4B and 4C illustrate potential professional development costs for individual states participating in the Common Core assessment consortia.

We project a total cost for professional development of approximately $5.26 billion across the states that have adopted the Common Core standards.


Discussion and Assumptions

The cost of professional development for Common Core was determined by first identifying a typical cost for professional development based on previous state experiences implementing academic standards, weighted by the relative size of the states. This cost was calculated to be approximately $1,931 per educator. This amount was then applied to the total number of educators in each Common Core state and aggregated across participating states. Cost information for professional development was secured for three representative states, including California, Washington, and Texas.

We considered whether to only assume professional development costs at the middle and upper grades for teachers responsible for English and mathematics (e.g., not for science or history teachers). The state estimates we obtained did not limit training to only English and mathematics teachers.

Figure 4A. Professional Development Costs for States in PARCC Only
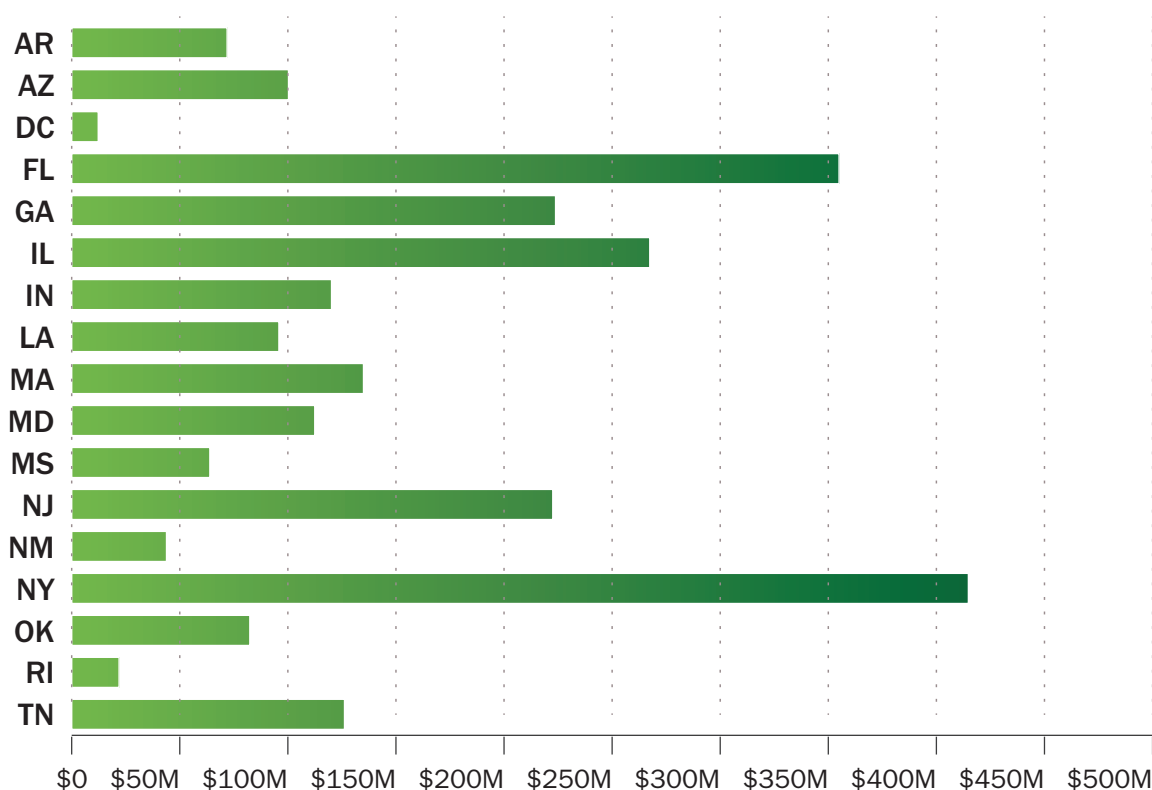
Given the Common Core's increased emphasis in English language arts on more challenging comprehension tasks, including on expository text not commonly emphasized in high school literature courses, we find it reasonable that the responsibility for preparing students to meet the standards would be shared among all teachers. As a result, we assume that all teachers will require training on the Common Core standards.

Additional information on the professional development costs available for these three states is below.

California

The California Department of Education has estimated the initial cost of professional development for the Common Core standards at $2,000 per teacher.[30]

Washington

The Office of the Superintendent of Public Instruction (OSPI) of Washington conducted an in-depth analysis of the implementation of the Common Core standards in that state. Local district and school costs associated with preparing teachers and other staff to implement the Common Core standards were estimated at $165 million over several years.[31] This represents a cost of approximately $3,087 per teacher.

Texas

The Texas Education Agency (TEA) has estimated that implementing the Common Core standards in the state would result in professional development costs of $60 million for the state and approximately $500 million for local school districts, resulting in a total professional development cost of $560 million.[32] This represents a per teacher cost of approximately $1,681.

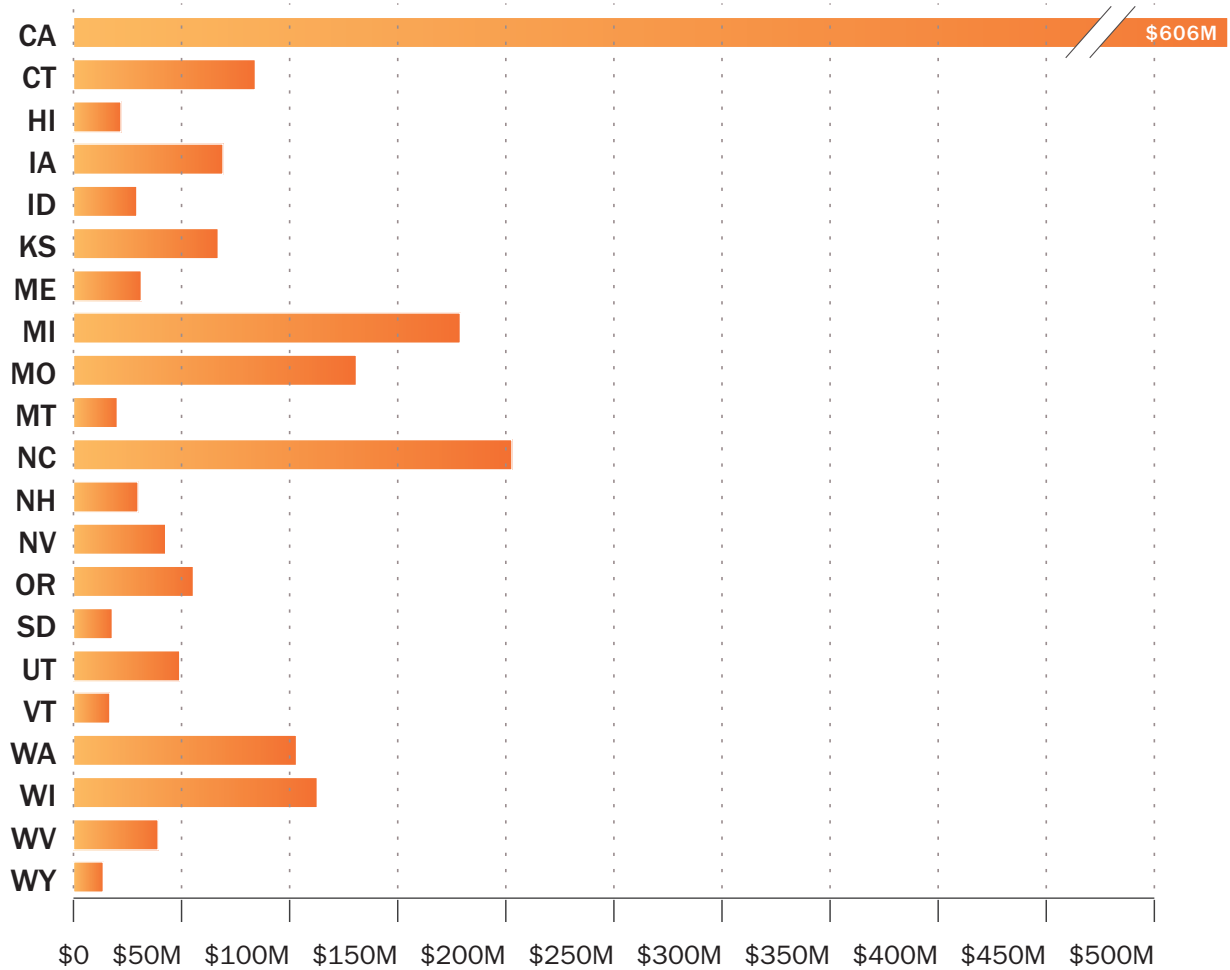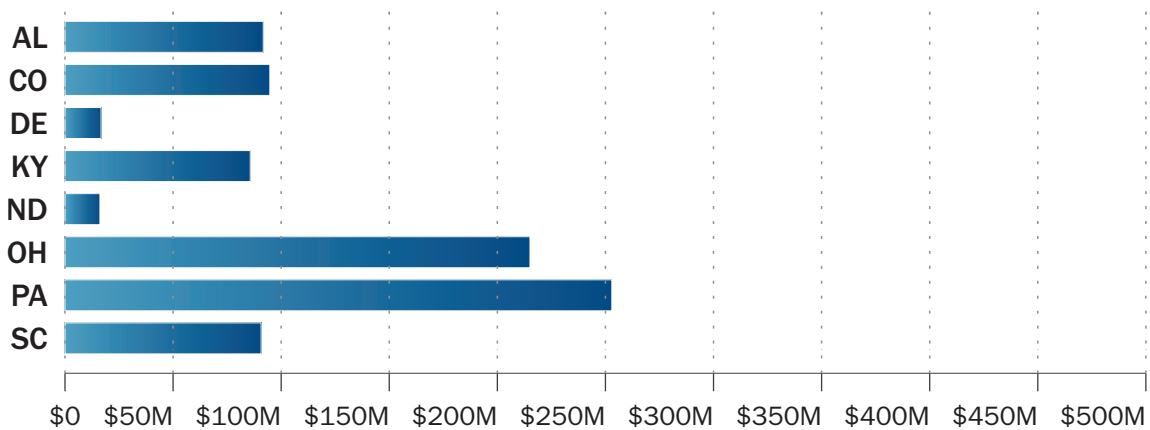## Figure 4B. Professional Development Costs for States in SBAC Only

Figure 4C. Professional Development Costs for States in PARCC and SBAC

Textbooks and Instructional Materials

Textbooks play a central role in defining the de facto curriculum in public school districts across the United States. What students are taught and largely what they learn is influenced heavily by the textbooks and other instructional materials used by their teachers. According to one study, "...80 to 90 percent of classroom and homework assignments are textbook-driven or textbook-centered."[33] Whether a state conducts a formal adoption process or its schools make these decisions entirely on their own, the Common Core standards are unlikely to be implemented in a coherent manner unless updated, aligned textbooks and other materials are obtained.

We project that states adopting Common Core will need to spend approximately $2.47 billion in one time costs to obtain aligned English language arts and mathematics instructional materials.

We project that states adopting Common Core will need to spend approximately $2.47 billion in one time costs to obtain aligned English language arts and mathematics instructional materials. Such materials should be in place before teachers are expected to teach or students are expected to meet the Common Core standards. Figures 5A, 5B and 5C illustrate potential textbook and instructional materials costs for individual states participating in the Common Core assessment consortia.

Discussion and Assumptions

Textbook lifespans are limited and, as a result, all textbooks must be replaced over time even if states do not modify their academic standards.[34] Estimates for the lifespan of K-12 textbooks vary for different states and for the overall average, typically ranging from as little as 2 years to as much as 6 years.[35] School systems implementing Common Core, however, must ensure that all students have updated, aligned textbooks by the academic year in which students are to be tested on the new assessments. We assume that states participating in the two assessment consortia will roll out new assessments on time in the 2014-2015 academic year; therefore, updated instructional materials must be provided for all students no later than fall of 2014.

At a time of strained school budgets, when school systems might otherwise decide to delay or push back normal textbook replacement purchases and tolerate increasingly worn but still usable materials, those in states implementing Common Core will not have that option. Instead, states working to ensure a serious implementation of the new standards will face a real, one-time cash expense for wholesale adoption of new Reading/Language Arts and mathematics materials over the next two years (instead of a typical timeframe closer to four years). To account for the fact that some textbook purchases might have occurred anyway during this period, we conservatively adjust (reduce) this one time cost by a factor of 50 percent. (N.B., given the nature of this estimate, some school systems will need to budget significantly more than assumed in this analysis in order to ensure that all of their students receive the materials they need.)

Once the up-front textbook costs are incurred, replacement of lost or worn out textbooks is a normal operational cost regardless of the standards; therefore, we do not include

Figure 5A. Textbooks and Materials Costs for States in PARCC Only
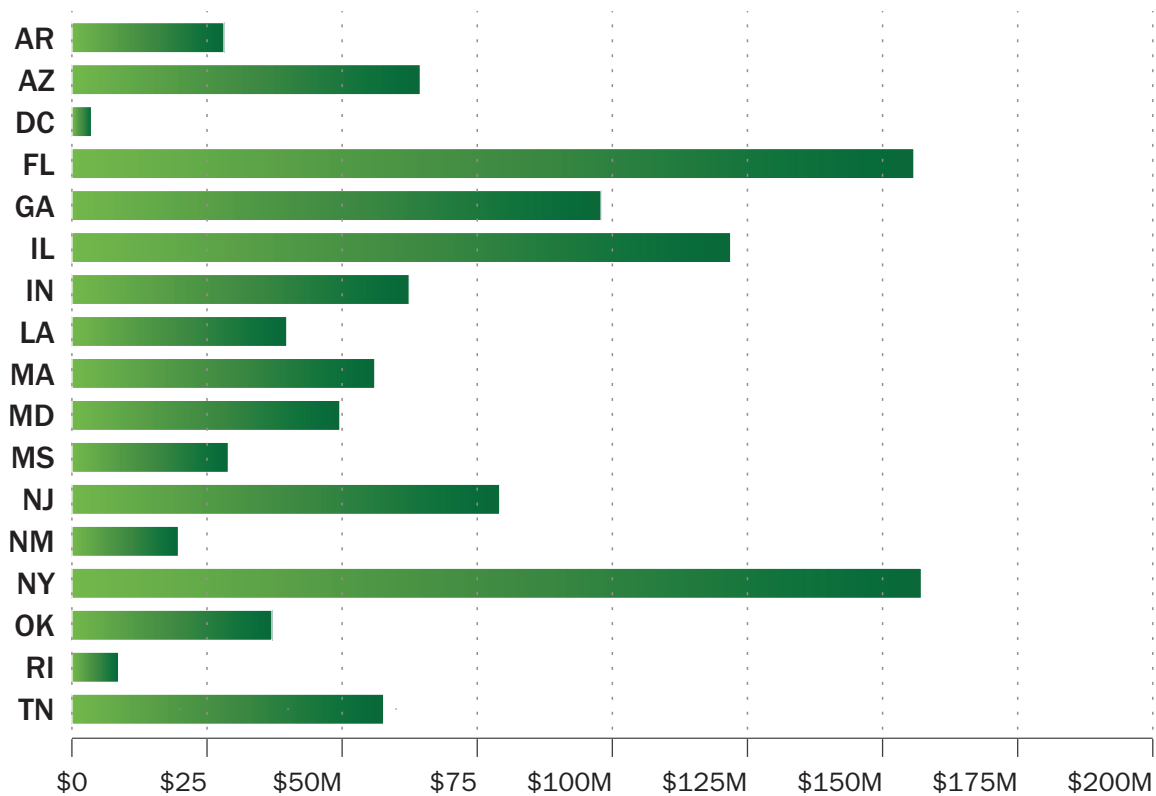
additional ongoing costs over the seven operational years of our analysis. (In fact, districts implementing the wholesale adoption of new Reading/ELA and mathematics instructional materials assumed here may expect to see some savings in their annual replacement costs for the following one to three years due to the recent purchase of new materials.)

Individual, state-by-state estimates in the nearby graphs illustrate potential costs, with the caveat that schools in states that negotiate bulk pricing for textbooks and other materials may incur lower costs than those in states that do not.

Estimates for the per student cost of instructional materials vary significantly, in part depending on whether a particular estimate is limited solely to the textbook

itself or if it also includes other materials. For this analysis, we averaged two representative estimates for per student cost of materials in each subject, English language arts and Mathematics, and applied these to the number of students in states that have committed to the Common Core standards.

One estimate, developed by the California Department of Education, is typical of the lower end of such cost estimates. It is provided as a total aggregate cost of $483 Million across all California local school systems.[36] When divided by the most recent available enrollment statistics for the state from the National Center for Education Statistics, the result is an estimated per student materials cost of $77.19 across both Reading/Language Arts and mathematics.[37]

Figure 5B. Textbooks and Materials Costs for States in SBAC Only

State	Cost
CA	$374M
CT	
HI	
IA	
ID	
KS	
ME	
MI	
MO	
MT	
NC	
NH	
NV	
OR	
SD	
UT	
VT	
WA	
WI	
WV	
WY	

$0 $25 $50M $75 $100M $125M $150M $175M $200M
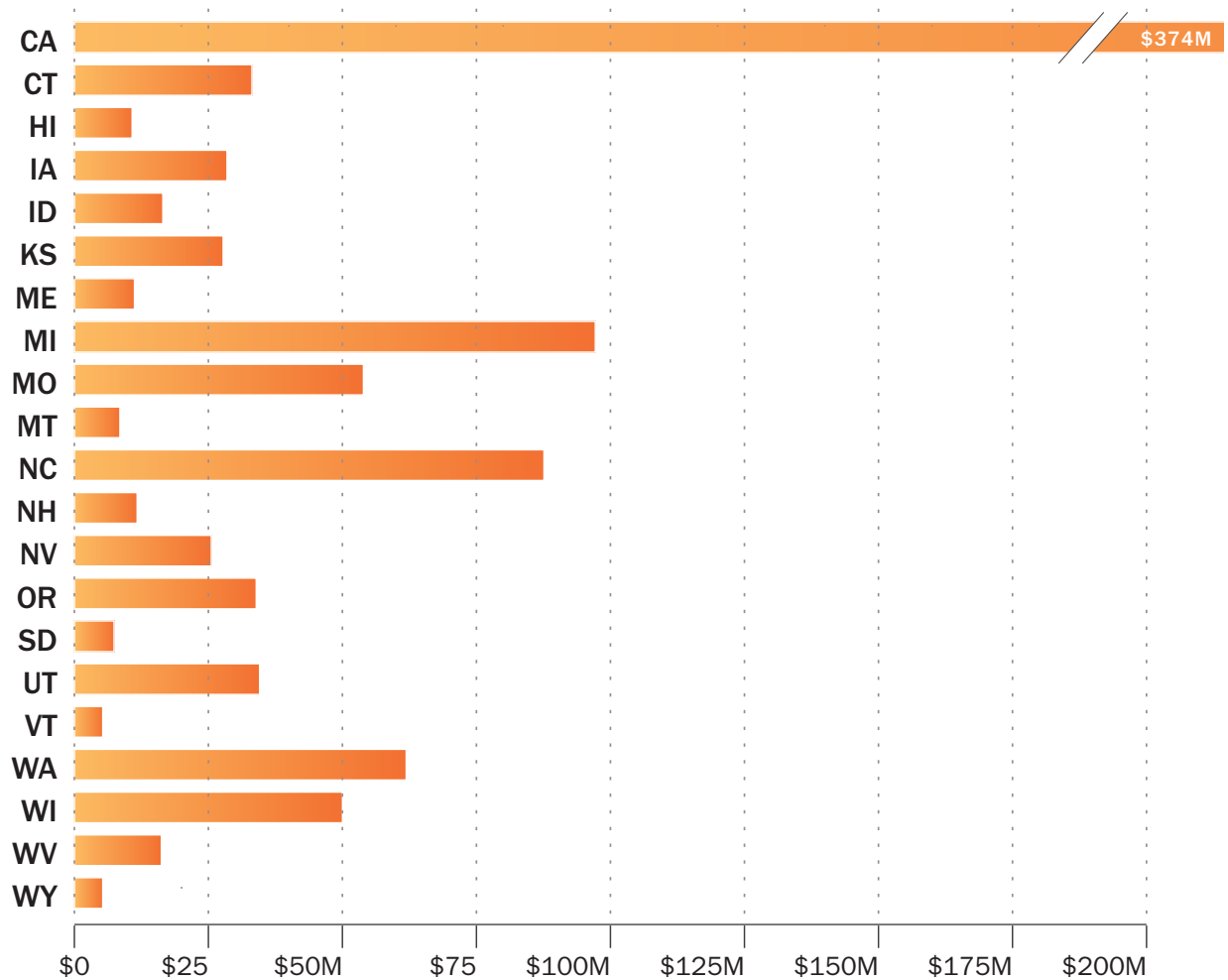
Figure 5C. Textbooks and Materials Costs for States in PARCC and SBAC

State
AL
CO
DE
KY
ND
OH
PA
SC

$0 $25 $50M $75 $100M $125M $150M $175M $200M
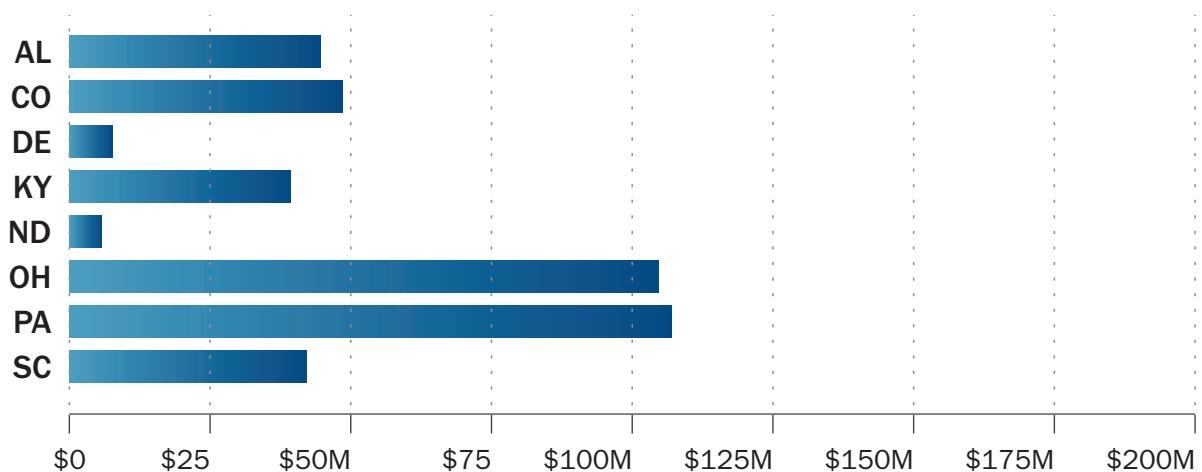
The second set of estimates, developed by the Florida Association of District Instructional Materials Administrators (FADIMA), is typical of higher cost estimates (though certainly not the highest). It is published with extensive documentation and detail and aims to be comprehensive, identifying a range of particular texts, consumables, manipulatives, and other potentially useful instructional materials from particular vendors, differentiated by individual grade level. We excluded from this source the cost of remedial or "intervention" instructional materials because such materials already present in schools can be more easily be adapted to a different set of standards. Based on this source, per student costs ranged from $65.00 in elementary Mathematics to $144.17 for Kindergarten Reading/Language Arts (with other costs, including middle and high school, in between).[38]

Technology Infrastructure and Support

Costs for technology infrastructure and support related to the Common Core standards are incorporated in this analysis due to current plans for implementing online testing by the two federally funded testing consortia, PARCC and SBAC. State experimentation with online testing is widespread,[39] but broad implementation across all students participating in federally mandated testing is not common and will require additional substantial expenditure in improved technology infrastructure, training and support.[40]

We project approximately $6.87 billion in increased local district technology costs for states planning to implement one of the Common Core assessments under development by PARCC or SBAC assessment consortia. This includes $2.8 billion in one-time, up-front costs, $326 million in additional costs in the first year of operation, and $624 million in additional costs for the remaining six years in the model. Figures 6A, 6B and 6C illustrate potential technology costs for individual states participating in the Common Core assessment consortia. Since they are not based on a detailed investigation of available technology in every district in every state, they should be interpreted as illustrative; given the large potential costs, we encourage each participating state to survey its school districts and obtain an independent feasibility and cost analysis.


We project approximately $6.87 billion in increased local district technology costs for states planning to implement one of the Common Core assessments under development by PARCC or SBAC assessment consortia..

Discussion and Assumptions

In recent years, a few states have performed and published comprehensive feasibility studies regarding broad implementation of online testing, notably South Carolina and Texas.[41] These in-depth analyses, while developed independently and by different entities, share many similar results. Based on surveys of available technology in local districts as well as expert analysis, both found that online testing would result in significantly higher costs for the foreseeable future. Reduced costs for printing, shipping and scoring tests were more than offset by increased costs in other areas, including, but not limited to: computers, hardware and bandwidth; staff training; staffing levels; innovative test items; and, increased psychometric analyses.

Figure 6A. Multi-Year Technology Costs for States in PARCC Only
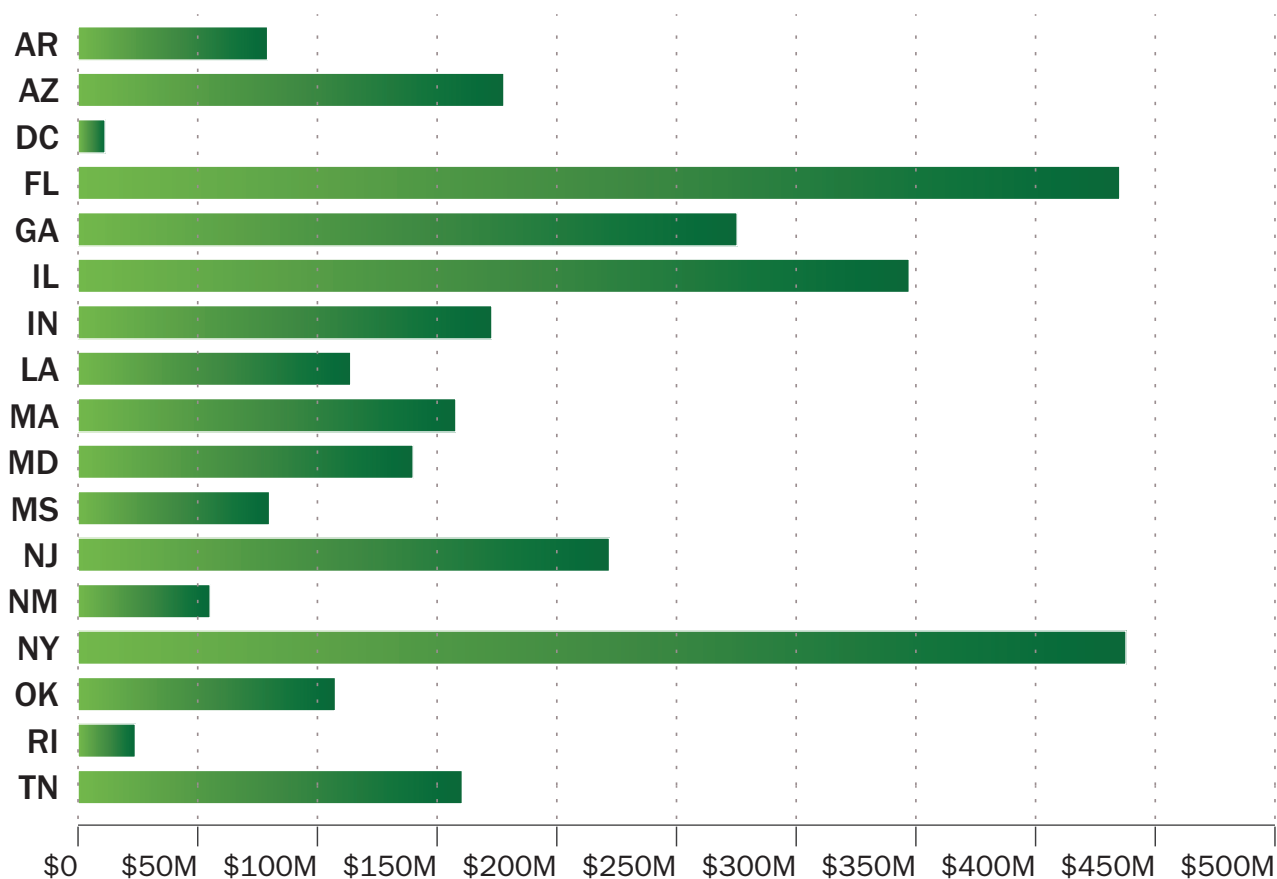
For the purposes of this study, we identify the following areas of significant technology-related costs and estimate assumed costs based on the thorough analyses conducted for South Carolina and Texas. (It should be noted that, in the most recent data available from the National Center for Education Statistics, South Carolina was comparable to the national average in the number of computers per student while Texas was somewhat ahead.)[42]

Computers

While there are significant numbers of student computers in most schools, not all computers are in adequate working order and not all are available for online testing or located in environments suitable for such use (e.g., individual classroom computers). Statewide averages can also mask unequal

distribution. Figure 6D summarizes a key finding of the South Carolina feasibility study that only a little more than half of all student computers in schools were available for online testing. To achieve an adequate (4:1) ratio of computers to students for online testing, 162,500 computers were necessary but only 100,372 were initially available (see Figure 6E).

We assume in this analysis that a 4:1 ratio of students to computers is necessary for efficient online testing (with testing windows of a couple of weeks), but that the initially available ratio is about 7.5:1. We also assume that approximately one-third of this difference can be made up by temporarily relocating or repurposing some of the other student computers during the testing period without excessive disruption or negative impact on

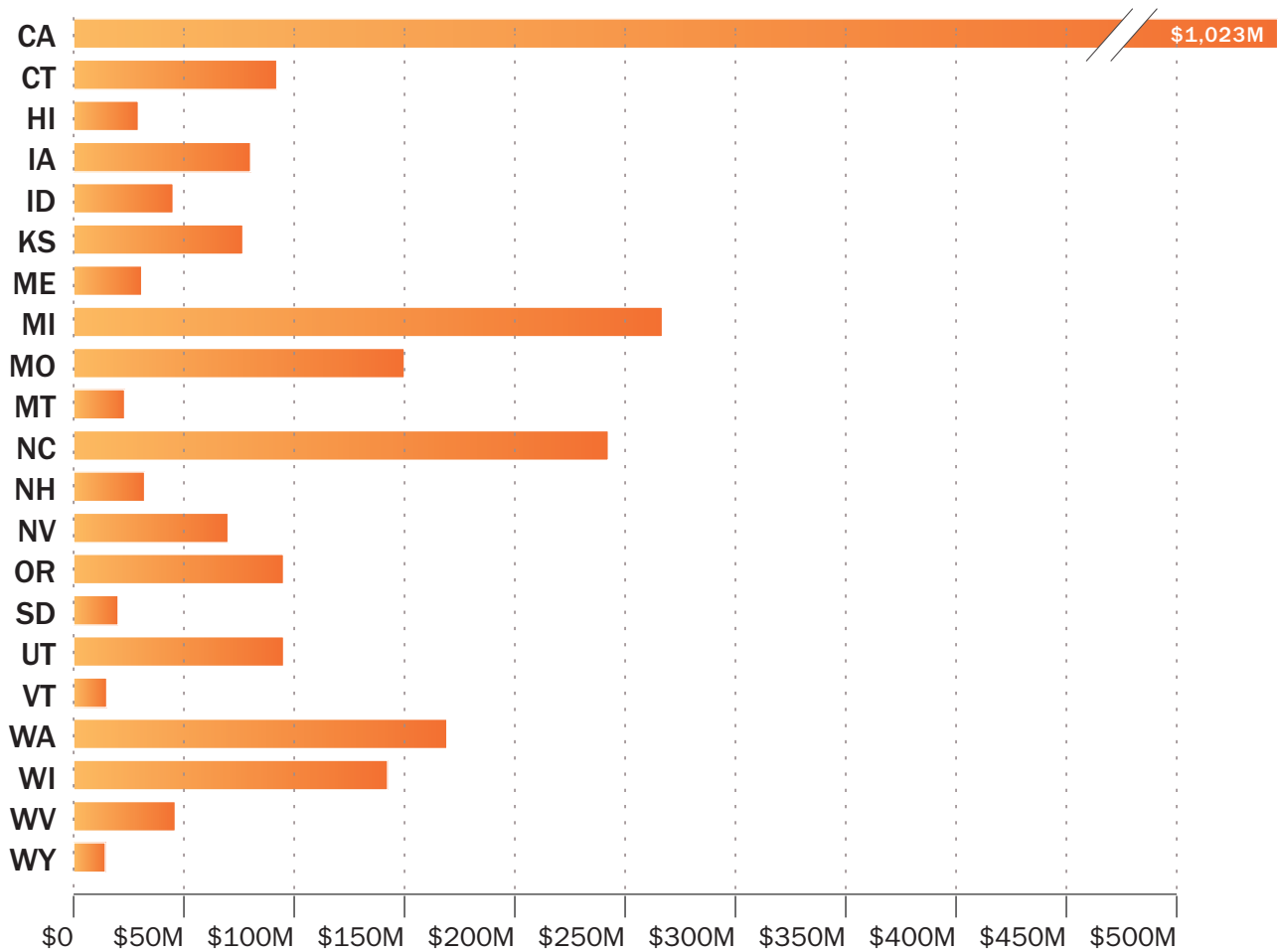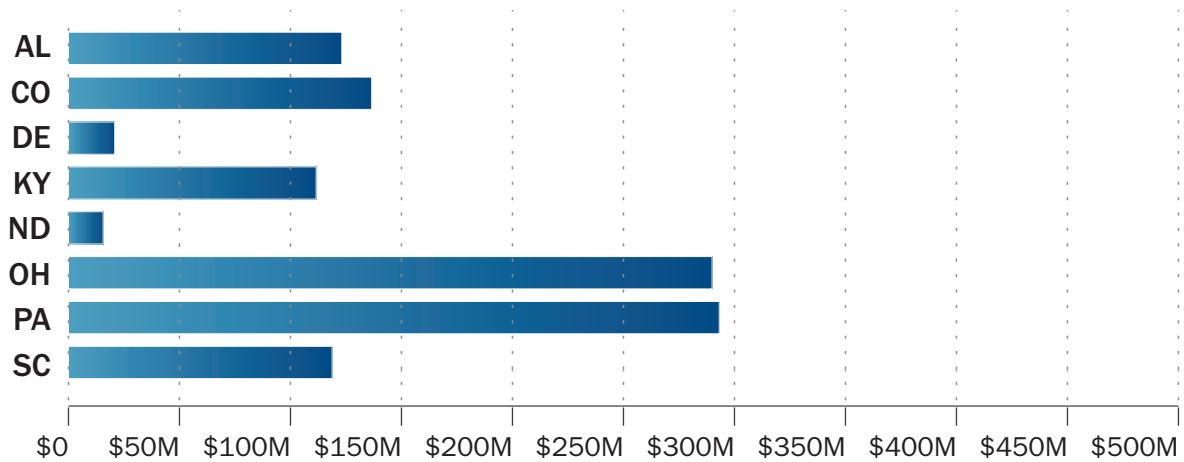## Figure 6B. Multi-Year Technology Costs for States in SBAC Only

Figure 6C. Multi-Year Technology Costs for States in PARCC and SBAC

Figure 6D. Computers Available to Students - South Carolina

Not Available
for Testing **43%** **57%** Available
for Testing
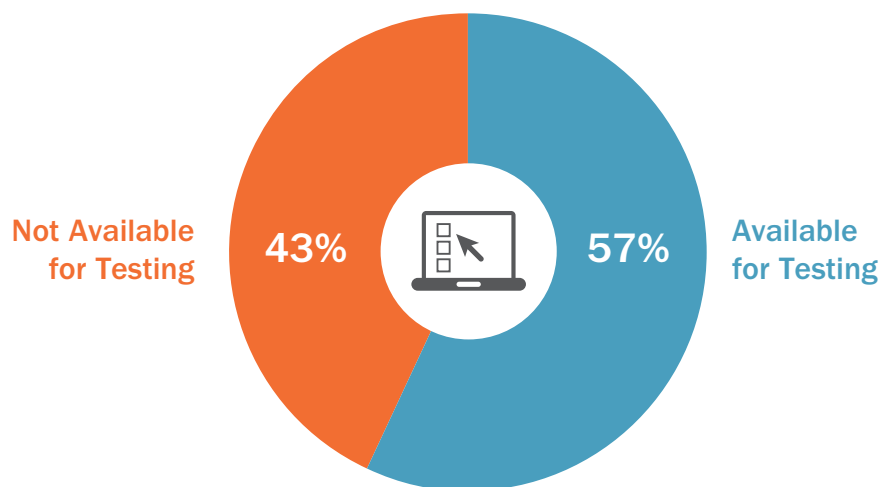
Figure 6E. Total Computers Needed to Accomodate Electronic Testing - South Carolina

Total computers available for
testing (based on survey data) = **100,372**

Number of *additional*
computers needed = **62,128**

Total computers to achieve a 4:1 student-to-testing ratio = **162,500**

= 1,000 Computers

Source: DRC SC Feasibility Report (2007) p. 6-12

other important uses (e.g., computer use in instruction). We also assume that the purchase cost of the additional computers is approximately $750, which includes not only the cost of the hardware but also installation and any necessary software; we use a lower amount than the $1,000 per computer figure used in the South Carolina and Texas feasibility studies because computer costs have a history of declining.[43] We further assume a 5-year depreciation schedule that is standard for computer equipment, which implies 20 percent annual cost for eventual replacement.

Wiring and Bandwidth

We expect that some additional electrical as well as network wiring will be necessary for the added computers. Similarly, additional proxy server machines will be required to support the bandwidth demands of the additional computers. We assume $2,000 in wiring costs and $750 for a student-level proxy server machine for each additional 25 computers.

Training and Technical Support

Training on the online testing system will be necessary for teachers or other instructional staff who supervise students during testing. We assume that one proctor will be necessary for every 30 students and that each proctor will receive three hours of training at a cost of $75 per hour. We only include training costs during the first year of operation, assuming that the training of replacement proctors in out years can be managed locally with existing resources.

Technical support will be required during online testing each year. We assume that 10 hours of support will be required for every 25 computers used for online testing at a cost

of $30 per hour. Notably, we do not include the cost of supporting the added computers at other times during the school year.

Power

Computer usage during online testing will draw electrical power and incur utility costs. We assume that students at tested grades will participate in online assessment for approximately four hours each year at a cost $0.11 per hour.[44]

State Profile: California

California, with the largest student population among the states, will likely play a pivotal role in the implementation of the Common Core standards. The decision by Texas, which has the second largest population, to reject the Common Core magnifies the importance of the rollout in California. A smooth implementation would help solidify the perception of Common Core as the dominant approach to standards-based reform, while a serious stumble in California might raise questions about its future.

Due to the prolonged economic downturn, California public schools are struggling with the effects of several years of flat or declining revenues from the state.

From the 2007-2008 school year to 2010-2011, the state budget for K-12 education has declined from $62.9 billion to $56.7 billion, a reduction of nearly 10 percent.

California's locally-developed academic standards have been judged at least as good as, if not significantly better than, the Common Core standards by one of the strongest advocates for the Common Core: The Fordham Institute.[45] In English language arts, Fordham rated the California standards an "A", while the Common Core received only a grade of "B+". Similarly, in mathematics, Fordham graded California's standards an "A," while the Common Core received a score of "A-". Other national organizations have also judged California's standards to be among the very best. The

 American Federation of Teachers (AFT) judged California's mathematics standards, which were developed in a process led by top mathematicians, as "strong" (the organization's highest rating).[46]

Since the development of its current standards, California has spent tens of millions of dollars each year to develop and administer assessments aligned to its standards at grades 2 through 11. The state further spent $1.6 billion to assist local districts with implementation. This included $800 million for state curriculum frameworks in each subject as well as adoption of aligned textbooks and instructional materials; due to its size, California commands the greatest attention of the publishers of textbooks and other materials. The state also spent $785 million for professional development to familiarize educators and administrators with its academic standards.[47]

Recently, the California Department of Education estimated a cost of $2,000 for each teacher for training on the new standards, with $237.5 million required to address only districts with "priority" schools in need of intensive assistance. The state department also believes that additional ongoing training would be necessary, as well as special training estimated to cost $118.8 million on applying the new standards to students who are English learners.[48] Based on the number of California teachers reported by the National Center for Education Statistics in the 2009-2010 school year, it is estimated that initial core training for teachers in all California schools would cost approximately $627.6 million.

The California Department of Education also estimated the cost to districts of implementing ELA and mathematics instructional materials that are "fully aligned" with the Common Core standards at $483 million.[49] While the state department also estimates the cost of a second option with only partially aligned materials, we believe that a serious implementation of the Common Core standards requires textbooks and other materials that are properly aligned to the new academic standards and accompanying assessments; teachers should not be expected to jump and skip through partially aligned materials while scrambling to fill gaps or rearrange out of sequence presentations of skills.

The state department further estimated that implementing the SBAC consortium assessments aligned to the Common Core standards would increase California's state testing costs by approximately $10 per student annually, or $35 million each year. Over seven years, the increase would total $245 million. This would be added to the state's current testing contracting expenditure of approximately $54.3 million each year.

[I]mplementing the SBAC consortium assessments aligned to the Common Core standards would increase California's state testing costs by approximately $10 per student annually, or $35 million each year. Over seven years, the increase would total $245 million..

Because the SBAC assessment will be available exclusively as an online assessment, many California schools would need to make substantial expenditures in technology infrastructure and support to administer it. Based on typical school technology infrastructure and capacity, we project that California schools would need to make an initial, one-time investment of about $418.5 million in computers and other infrastructure as well as additional annual expense, assuming a testing window comparable to current state policy. Over a seven-year period, we estimate that the increased state expenditure for technology and support would total about $1 billion ($1,022.6 million). Additional details on technology cost assumptions are included in the Technology section of this analysis. It is important to caution that these projections rely on nationwide assumptions based on online testing feasibility studies in different states; to develop a more precise figure, we recommend that California survey its districts on their technology needs and capabilities and obtain an independent cost analysis based on that information.

In light of these substantial costs, California would benefit from a broader and more vigorous public debate on the topic of adopting the Common Core standards. At a time of extended financial hardship for many local schools, would time and money spent realigning to the Common Core standards constitute the most promising strategy for improving education and increasing student outcomes? Or would this attention, as well as any new funds that could somehow be identified, be better focused on efforts to assist more students in actually achieving the state's current, high academic standards? Only California's citizens can make that judgment. But an open, informed weighing of the costs and benefits of adopting the Common Core standards—something that has not occurred to date—merits serious consideration by the state's officials.

Conclusion and Recommendations

Implementation of the Common Core standards is likely to represent substantial additional expense for most states. While a handful of states have begun to analyze these costs, most states have signed on to the initiative without a thorough, public vetting of the costs and benefits. In particular, there has been very little attention to the potential technology infrastructure costs that currently cash-strapped districts may face in order to implement the Common Core assessments within a reasonable testing window.

Implementation of the Common Core standards is likely to represent substantial additional expense for most states.

The nation-wide cost analysis contained in this report is intended to be illustrative of the key expenditures necessary for implementing the Common Core. States and local communities can use it as a starting point in developing their own analyses of local needs and costs.

We recommend that states and local school systems considering Common Core:

- Analyze carefully the future annual costs of using the assessments being developed by the SBAC and PARCC consortia. Even though the development costs are covered by federal grants, some states will find—as California has—that annual operating costs may increase significantly.

- Develop a technology feasibility assessment to consider local readiness to implement online assessment for all students.

- Identify the resources necessary to provide fully aligned instructional resources and materials. The burden of stitching together conflicting instructional programs, textbooks and other materials with only "guidance" as support is unfair to teachers as well as students.

- Ensure that thorough professional development is provided to all teachers. Without sufficient teacher understanding of the standards and assessment expectations, students will not receive an adequate opportunity to learn the material on which they will be tested.

- Once both the expenses have been identified and analyzed, states should step back and encourage a public discussion of the potential benefits and costs of implementing the Common Core standards. Is realigning the local education system to the Common Core standards the best investment of scarce educational resources? What are other options that should be considered? Each community must answer these questions for itself, based on a hardheaded appraisal of its own needs as well as a realistic assessment of the Common Core standards initiative.

Appendices

For Appendices that further detail the assumptions used in this study, please visit:

http://www.accountabilityworks.org/news.php?viewStory=23

About the Authors

AccountabilityWorks

AccountabilityWorks (AW) is a non-profit organization dedicated to the dual goals of research that supports sound education policy and assisting states and schools in implementing high quality assessment and accountability systems. AW works on such initiatives on behalf of states, schools, other reform-minded organizations, and parents.

Lead Contributor

Theodor Rebarber is the founder and chief executive officer of AccountabilityWorks (AW). At AW, his work relevant to this study has included overseeing the development of both paper and online assessments, some of which involved managing the work of a consortium of states. He has also been a contributor to a number of national and state analyses of the costs of implementation of previous federal education initiatives (NCLB). Before that, he was chief education officer for a system of charter schools, with responsibility for curriculum and textbooks, professional development, assessment, and school academic operations. He has worked on education legislation as a legislative director in Congress, standards and testing at the U.S. Department of Education, and education policy and research at the Vanderbilt Institute for Public Policy Studies (VIPPS).

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Endnotes

1. For examples of the differing levels of quality (e.g., rigor and clarity), see the annual reports from AFT or Fordham Foundation. In addition, Andrew Porter, Morgan Polikoff, and John Smithson in their 2008 study, Is there a de facto national curriculum? Evidence from state content standards, found low alignment of standards across states. They evaluated how well each standard was represented in each state at a particular grade level; a perfect match would yield a 1.0 agreement. Depending on the grade and subject, they reported average alignments of 0.20–0.27.

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5. Ze'ev Wurman and Sandra Stotsky. "Why Race to the Middle?" White Paper No. 52. Boston: Pioneer Institute. (February 2010).
http://www.pioneerinstitute.org/pdf/100223_why_race_to_ the_middle.pdf;

6. See Brian Edwards.(June 2010). "California and the "Common Core": Will There Be a New Debate About K–12 Standards?" Mountain View CA: EdSource, for a good review of the process involved in the development of the Common Core Standards. "The final guidance for the RTT program, issued in November 2009, accentuated the focus on the Common Core by declaring that states applying for RTT grants would earn more points if they belonged to a consortium that included a majority of states. The final guidance also gave more points to applicant states that committed to adopting common standards by August 2010. With RTT applications due in either January or June 2010, and the final draft of the Common Core expected to be completed some time in the spring, the U.S. Department of Education (USDE) was effectively asking states to commit to something they would have little or no time to review." pp. 9-10.

7. See Common Core, In the States: State Map. http://www.corestandards.org/in-the-states

8. Francie Alexander, "Accountability and Assessment California Style." In Education Reform in the '90s, Chester Finn and Theodor Rebarber (Eds). (1992). New York, NY: Macmillan Company; Marshall Smith and Jennifer O'Day. "Putting the Pieces Together: Systemic School Reform," Consortium for Policy Research in Education Policy Briefs. (1991). www.eric.ed.gov

9. National Center for Education Statistics (NCES), "State Nonfiscal Survey of Public Elementary/ Secondary Education" 2009-10, v.1a, Common Core of Data (CCD)

10. For example see Eric Hanushek. (October 2005)."The Alchemy of "Costing Out" an Adequate Education." "Adequacy Lawsuits: Their Growing Impact on American Education." Cambridge, MA: Kennedy School of Government, Harvard University; Susan Zelman, Projected Costs of Implementing the Federal "No Child Left Behind" Act in Ohio http://www.accountabilityworks.org/photos/OH_Cost_Study_Packet.pdf

11. Center for K-12 Assessment & Performance Management at ETS. "Coming Together to Raise Achievement. New Assessments for the Common Core State Standards." Updated July 2011. Princeton, NJ: ETS. (2011)

12. See part D(2) of the RTT criteria: "Improving teacher and principal effectiveness based on performance." http://edocket.access.gpo.gov/2009/pdf/E9-27426.pdf, p.59821, or http://www2.ed.gov/legislation/FedRegister/announcements/2010-2/041410a.pdf, p. 19504.

13. Michael Winerip. (June 2011). "Helping Teachers Help Themselves". *The New York Times*. http://www.nytimes.com/2011/06/06/education/06oneducation.html?_r=1

14. For example Gates Foundation project, Measures of Effective Teaching (MET), supports activities for the following groups: higher education (Dartmouth College, Harvard University, Stanford University, University of Chicago, University of Michigan, University of Virginia, and University of Washington), nonprofit organizations (Educational Testing Service, RAND Corporation, and the New Teacher Center), and several for-profit education consultants (Cambridge Education, Teachscape, and Westat).

In addition, the National Board for Professional Teaching Standards and Teach For America are supporting the project and have encouraged their members to participate. See: http://www.metproject.org/downloads/met-framing-paper.pdf. In addition, Gates also supports specific state activities via non-profit funding, for example Gates recently awarded $9.7 million to the Colorado Legacy Foundation to work with the state Department of Education on the implementation of new teacher evaluation systems; see *Denver Post* at http://www.denverpost.com/breakingnews/ci_18263989.

15. Barry Topol, John Olson, Ed Roeber of Assessment Solutions Group (ASG). "The Cost of New Higher Quality Assessments: A Comprehensive Analysis of the Potential Costs for Future State Assessments." Stanford, CA: Stanford University, Stanford Center for Opportunity Policy in Education. (2010) pp. 23-26.

16. PARCC: Application for the Race to the Top Comprehensive Assessment Systems Competition.

(June 23, 2010). p. 248. http://www.fldoe.org/parcc/pdf/apprtcasc.pdf.

17. Laura McGiffert Slover, Senior Vice President, Achieve, Inc. Personal communication with Theodor Rebarber. September 19, 2011.

18. Grunwald Associates LLC. An Open Source Platform for Internet-based Assessment. (2010). 3. http://www.grunwald.com.

19. Grunwald, 3.

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24. Smarter Balanced Assessment Consortium. Computer Adaptive Testing.

25. Marshall Smith and Jennfier O'Day. "Systemic School Reform," Susan Furhman and Betty Malen (Eds.). "Politics of Curriculum and Testing." Philadelphia: Falmer. (1991); from the National Academy of Sciences a compilation of articles, reports, and testimony prepared by Alexandra Beatty, Rapporteur, Committee on State Standards in Education: A Workshop Series, Washington, D.C.: National Research Council. (2008).

26. See Francie Alexander, "Accountability and Assessment California Style." "In Education Reform in the '90s," Chester Finn and Theodor Rebarber (Eds). (1992). New York, NY: Macmillan Company.

27. From the AFT 2010 resolution: A Common Core: High Standards For All Schools. "...Whereas educational reforms important to the AFT, such as those detailed in "A New Path Forward" and "AFT's Pathway to Student Success"—including responsible, effective teacher development and evaluation processes; ongoing, job-embedded professional development aligned to staff needs for professional growth; and effective, appropriate assessments designed to further student learning— all depend first on having and implementing a clear set of standards that are specific, detailed and rigorous...RESOLVED, that the AFT continue to advocate for common core standards and the development of aligned curriculum, professional development based on the curriculum, teaching materials, student intervention systems and assessments..." http://www.aft.org/about/resolution_detail.cfm?articleid=1589

28. Nancy Kober, Diane Stark Rentner, Jack Jennings, and Bruce Haslam. "Common Core State Standards: Progress and Challenges in School Districts' Implementation." Washington, D.C.: Center on Education Policy. (September 2011).

29. Kate Ash. "Common Core Accelerates Interest in Online PD," *Education Week*. (October 2011). http://www.edweek.org/ew/articles/2011/10/26/09edtech-commonco...2lt8GMEJ5X935X7st8I7%2FGow&cmp=ENL-EU-NEWS2&intc=EW-PD1011-ENL

30. Tom Torlakson. California Department of Education Initial Estimate of Federal Waiver Fiscal Impact. Attachment 6. (November 3, 2011). p. 2 of 14 http://www.cde.ca.gov/be/ag/ag/yr11/documents/bluenov11item05.doc

31. Jessica Vavrus. "The Common Core State Standards for English Language Arts and Mathematics: Analysis and Recommendations." Report to the Legislature. Sacramento, CA: OSPI. (January 2011; amended February 1, 2011). p. 29.

32. Richard Todd Webster,Texas Education Agency, chief of staff. (July 20, 2011).Personal communication with Theodor Rebarber.

33. Chester E. Finn, Jr. and Diane Ravitch. "Mad, Mad World of Textbook Adoption." Washington, D.C.: Thomas B. Fordham Institute. (September 2004). p.1.
http://www.edexcellence.net/publications-issues/publications/madmadworld.html.

34. A number of states and school systems are considering implementation of digital textbooks. The life cycle costs for such "virtual" instructional materials would be calculated quite differently from the assumptions described in this study. While some hope that significant savings could be achieved as a result of such initiatives, the evidence so far is very limited. There is little doubt, however, that there would continue to be substantial ongoing materials costs, such as for periodic replacement of the technology hardware (e.g., e-reader or iPad) and for updates to the instructional content itself.

35. See, for example: Ahmed Tantawy, Brian Guernsey, Josh Lauman, Pranav Dharwadkar, Tapan Kamdar. PEARSON eTextBook Reader. Berkeley, California: Haas School of Business. p. 2
http://www.slideshare.net/tkamdar/pearson-e-textbook-reader

Geoffrey H. Fletcher. "Making the Big Shift," *THE Journal*. (June 17, 2011) p. 1
http://thejournal.com/articles/2011/06/17/making-the-big-shift.aspx

36. Tom Torlakson. California Department of Education Initial Estimate of Federal Waiver Fiscal Impact. Attachment 6. (November 3, 2011). p. 2 of 14
http://www.cde.ca.gov/be/ag/ag/yr11/documents/bluenov11item05.doc

37. The state of California may use a figure of $75 per student for student materials cost, with the total state materials cost of $483 million based on a projected enrollment statistic from a later year than the 2009/10 federal enrollment statistics used throughout this analysis. Since the total cost figure for the state is the same, there is not a practical, material impact from this divergence. The 2009/10 California enrollment figure used here is drawn from the following source (and included as an appendix to this analysis):

National Center for Education Statistics (NCES), "State Nonfiscal Survey of Public Elementary/ Secondary Education" 2009-10, v.1a, Common Core of Data (CCD)

38. Florida Association of District Instructional Materials Administrators (FADIMA).Instructional Materials Cost Analysis For Fiscal Year 2011-2012.
http://www.fadima.net/pdf/CostAnalysis2011-12.pdf. (August 2010).

39. Grunwald.

40. The national organization of state directors of education technology have recognized the substantial technology infrastructure costs needed for the implementation of Common Core

standards and assessments. For a summary of the issues see: "High Stakes Online Testing Coming Soon!" at
http://thejournal.com/Articles/2011/06/07/High-Stakes-Online-Testing-Coming-Soon.aspx?p=1

41. Texas Education Agency. An Evaluation of Districts' Readiness for Online Testing (Document No. GE09 212 01). Austin, TX: Texas Education Agency, 2008; Data Recognition Corporation, South Carolina Study on the Feasibility and Cost of Converting the State Assessment Program to a Computer-Based or Computer-Adaptive Format FINAL REPORT, (June 25, 2007).

42. US Department of Education.NCES Digest of Educational Statistics, 2010.
http://nces.ed.gov/programs/digest/d10/

43. Ben Worthen. "Rising Computer Prices Buck the Trend." *The Wall Street Journal*, December 13.
http://online.wsj.com/article/SB10001424052748704681804576017883787191962.html (December 2010).

44. US Energy Information Administration. Average Retail Price of Electricity to Ultimate Customers: Total by End-Use Sector. (March 2011).
http://ei-01.eia.doe.gov/cneaf/electricity/epm/table5_3.html

45. Thomas B. Fordham Foundation. "The State of State Standards—and the Common Core—in 2010." http://www.edexcellence.net/publications-issues/publications/the-state-of-state.html

46. AFT. Sizing up state standards. (2008).
http://www.aft.org/pdfs/teachers/sizingupstandards0308.pdf

47. Brian Edwards. "California and the "Common Core": Will There Be a New Debate About K–12 Standards?." Mountain View, CA: Ed Source. (June 2010).
http://www.edsource.org/pub_common-core.html

48. Tom Torlakson. "California Department of Education Initial Estimate of Federal Waiver Fiscal Impact." Attachment 6. (November 3, 2011). pp. 8 and 9 of 14
http://www.cde.ca.gov/be/ag/ag/yr11/documents/bluenov11item05.doc

49. Torlakson.